

UNCLASSIFIED

AD NUMBER
ADB181560
NEW LIMITATION CHANGE
TO Approved for public release, distribution unlimited
FROM Distribution: Further dissemination only as directed by Army Rocky Mountain Arsenal Contamination Cleanup, Attn: AMXRM, Aberdeen Proving Ground, MD 21010, JUN 1990, or higher DoD authority.
AUTHORITY
3 my 1994, CETHA-BC

THIS PAGE IS UNCLASSIFIED

(UNCLASSIFIED)



AD NUMBER

B181560

LIMITATION CHANGES

TO

APPROVED for Public Release,
Distribution Unlimited
— Code A1

FROM

N/A

AUTHORITY

Report Documentation Page "SF 218"

(THIS PAGE IS UNCLASSIFIED)

AD-B181 560



90280R02
VOLUME II
2ND COPY



PROGRAM MANAGER

ROCKY MOUNTAIN ARSENAL CONTAMINATION CLEANUP

U.S. ARMY
MATERIEL COMMAND

— COMMITTED TO PROTECTION OF THE ENVIRONMENT —

COMPREHENSIVE MONITORING PROGRAM

Contract Number DAAA15-87-0095

FINAL BIOTA ANNUAL REPORT FOR 1989

JUNE 1990

Version 2.0

Volume II

DTIC
ELECTE
MAR 21 1994
S B D

R.L. STOLLAR & ASSOCIATES, INC.

Harding Lawson Associates
Ebasco Services Incorporated
DataChem, Inc.
Enseco-Cal Lab
Midwest Research Institute

DISTRIBUTION STATEMENT F: Further dissemination only as directed by
authority. *JUNE 90* or higher DoD

REQUESTS FOR COPIES OF THIS DOCUMENT
SHOULD BE REFERRED TO THE PROGRAM MANAGER
FOR THE ROCKY MOUNTAIN ARSENAL CONTAMINATION CLEANUP,
AMXRM ABERDEEN PROVING GROUND, MARYLAND

21010

94318096



90280R02
VOLUME II
2ND COPY

COMPREHENSIVE MONITORING PROGRAM

Contract Number DAAA15-87-0095

FINAL BIOTA ANNUAL REPORT FOR 1989

JUNE 1990

Version 2.0

Volume II

Prepared by:

R. L. STOLLAR & ASSOCIATES INC.
HARDING LAWSON ASSOCIATES
EBASCO SERVICES INC.
ENVIRONMENTAL SCIENCE & ENGINEERING, INC.
DATACHEM, INC.
MIDWEST RESEARCH INSTITUTE

Prepared for:

U. S. ARMY PROGRAM MANAGER FOR
ROCKY MOUNTAIN ARSENAL

**Rocky Mountain Arsenal
Information Center
Commerce City, Colorado**

THE VIEWS, OPINIONS, AND/OR FINDINGS CONTAINED IN THIS REPORT ARE THOSE OF THE AUTHOR(S) AND SHOULD NOT BE CONSTRUED AS AN OFFICIAL DEPARTMENT OF THE ARMY POSITION, POLICY, OR DECISION, UNLESS SO DESIGNATED BY OTHER DOCUMENTATION.

THE USE OF TRADE NAMES IN THIS REPORT DOES NOT CONSTITUTE AN OFFICIAL ENDORSEMENT OR APPROVAL OF THE USE OF SUCH COMMERCIAL PRODUCTS. THE REPORT MAY NOT BE CITED FOR PURPOSES OF ADVERTISEMENT.

94-08784



116008

70 21 8 118 00 6

TABLE OF CONTENTS

	PAGE
LIST OF TABLES	v
LIST OF FIGURES	viii
GLOSSARY	x
<u>VOLUME I</u>	
EXECUTIVE SUMMARY	
1.0 INTRODUCTION	I - 1
1.1 Site Background	I - 1
1.2 Nature and Extent of the Impact on Biota	I - 2
1.3 Synopsis of Previous Biota Investigations	I - 2
1.4 Overview of Current Biota Monitoring Program	I - 5
1.5 Organization of this Biota Annual Report	I - 7
2.0 ENVIRONMENTAL SETTING	I - 8
2.1 General Setting	I - 8
2.2 Physical Environment of RMA	I - 8
2.2.1 Climate	I - 9
2.2.2 Geology	I - 10
2.2.3 Soils	I - 10
2.2.3.1 CMP-BSA 11	I - 12
2.2.3.2 CMP-BSA 12	I - 12
2.2.3.3 CMP-BSA 13	I - 13
2.2.3.4 Newly Established Staked Sites for 1989	I - 13
2.2.4 Surface Water	I - 14
2.3 Biotic Environment of RMA	I - 14
2.3.1 Terrestrial Ecosystems	I - 15
2.3.1.1 Vegetation Resources	I - 15
2.3.1.2 Wildlife Resources	I - 18
2.3.2 Aquatic Resources	I - 21

Accession For	
NTIS GRA&I	<input type="checkbox"/>
DTIC TAB	<input checked="" type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By _____	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
E-5	

TABLE OF CONTENTS (continued)

	PAGE
3.0 CHEMICAL ANALYSIS PROGRAM STRATEGY AND METHODOLOGY	I - 25
3.1 Strategy	I - 25
3.1.1 Selection of Contaminants for Monitoring	I - 25
3.1.2 Spatial Distribution of Monitoring Effort	I - 27
3.1.2.1 Terrestrial BSAs	I - 29
3.1.2.2 Aquatic BSAs	I - 31
3.1.3 Species, Life Stages, and Seasons for Monitoring	I - 31
3.1.4 Tissues to be Sampled	I - 34
3.1.5 Replication of Samples	I - 35
3.2 Field Methodology	I - 36
3.2.1 Field Protocol	I - 36
3.2.2 Program Implementation	I - 36
3.2.2.1 Equipment	I - 37
3.2.2.2 Selection of Sampling Locations	I - 37
3.2.2.3 Selection of Individuals for Specimens	I - 39
3.2.2.4 Sampling Procedures	I - 39
3.2.2.5 General Handling Procedures	I - 41
3.3 Health and Safety	I - 42
3.4 Laboratory Methodology	I - 43
3.4.1 Analysis for Organochlorine Pesticides in Biota Tissue by Gas Chromatography/Electron Capture Detection (GC/ECD)	I - 43
3.4.2 Analysis for Mercury in Biota Samples by Cold Vapor Atomic Absorption Spectroscopy	I - 44
3.4.3 Analysis for Arsenic in Biota Samples by Graphite Furnace Atomic Absorption Spectroscopy	I - 44
3.5 Quality Assurance Procedures	I - 44
3.6 Data Management	I - 46
3.7 Data Description, Analysis, and Evaluation	I - 47

VOLUME II

4.0 RESULTS AND ANALYSIS OF CHEMICAL ANALYTICAL DATA FROM THE 1989 BIOTA MONITORING PROGRAM	II - 1
4.1 Chemical Results for Terrestrial Species	II - 2

TABLE OF CONTENTS (continued)

	PAGE
4.1.1 Target Analytes in Terrestrial Species	II - 2
4.1.1.1 Aldrin	II - 2
4.1.1.2 Dieldrin	II - 3
4.1.1.3 Endrin	II - 7
4.1.1.4 DDT	II - 8
4.1.1.5 DDE	II - 9
4.1.1.6 Arsenic	II - 9
4.1.1.7 Mercury	II - 11
4.1.2 Distribution of Target Analytes within Terrestrial Species Sampled	II - 12
4.1.2.1 Terrestrial Species	II - 12
4.1.2.2 Terrestrial Trophic Groups	II - 14
4.1.3 Distribution of Target Analytes among Terrestrial BSAs	II - 16
4.1.3.1 Sedentary Species	II - 16
4.1.3.2 Mobile Species	II - 20
4.2 Chemical Results for Aquatic Species	II - 21
4.2.1 Target Analytes in Aquatic Species	II - 21
4.2.1.1 Aldrin	II - 21
4.2.1.2 Dieldrin	II - 22
4.2.1.3 Endrin	II - 23
4.2.1.4 DDT	II - 23
4.2.1.5 DDE	II - 23
4.2.1.6 Arsenic	II - 24
4.2.1.7 Mercury	II - 25
4.2.2 Distribution of Target Analytes within Aquatic Species Sampled	II - 27
4.2.2.1 Aquatic Species	II - 27
4.2.2.2 Aquatic Trophic Groups	II - 29
4.2.3 Distribution of Target Analytes among Aquatic BSAs	II - 31
4.2.3.1 Sedentary Species	II - 31
4.2.3.2 Mobile Species	II - 32
4.3 Chemical Results for 1988 Residual Samples	II - 33
4.3.1 Chemical Results for 1988 Residual Samples of Intentional Species	II - 33
4.3.2 Chemical Results for 1988 Residual Samples of Fortuitous Species	II - 34

TABLE OF CONTENTS (continued)

	PAGE
5.0 SUMMARY	II - 38
5.1 Summary of Target Analyte Detections	II - 38
5.1.1 Analytes	II - 38
5.1.2 Species	II - 39
6.0 REFERENCES CITED	II - 41

VOLUME III

APPENDICES A AND B	IRDMS LABORATORY DATA AND FIELD DATA FORM INFORMATION (RAW DATA AND DISKETTES)
APPENDIX C	STATISTICAL METHODOLOGY
APPENDIX D	SPECIES NOMENCLATURE CHANGES

LIST OF TABLES

VOLUME I

Table 2.2-1	Hydrologic and Other Physical Characteristics for Terrestrial CMP-Biota Study Area Soils on RMA
Table 2.2-2	Chemical Characteristics for Terrestrial CMP-Biota Study Area Soils on RMA
Table 2.2-3	Physical/Chemical Characteristics for Aquatic CMP-Biota Study Area Sediments
Table 2.3-1	Generalized Vegetation Characteristics of Terrestrial Staked Sites and Control Sites on RMA
Table 2.3-2	Fish Stocking History for Rocky Mountain Arsenal (1961-1982); Number (Size, cm) of Each Species
Table 3.1-1	Ranges of Contaminant Concentrations Within or Above Respective Indicator Levels Detected in Soils During the RI Program
Table 3.1-2	Analytical Results for Soils at CMP-BSA 12 Staked Sites
Table 3.1-3	Summary of 1989 Contaminant Monitoring Field Program
Table 3.1-4	Selection Criteria for RMA Biota Monitoring Species
Table 3.4-1	Certified Reporting Limits (CRLs) for Target Analytes in Biota Tissue

VOLUME II

Table 4.1-1	Aldrin Statistical Results for Terrestrial Species on RMA in 1989
Table 4.1-2	Dieldrin Statistical Results for Terrestrial Species on RMA in 1989
Table 4.1-3	Endrin Statistical Results for Terrestrial Species on RMA in 1989
Table 4.1-4	DDT Statistical Results for Terrestrial Species on RMA in 1989
Table 4.1-5	DDE Statistical Results for Terrestrial Species on RMA in 1989
Table 4.1-6	Arsenic Statistical Results for Terrestrial Species on RMA in 1989
Table 4.1-7	Mercury Statistical Results for Terrestrial Species on RMA in 1989
Table 4.1-8	Summary of Detection Frequencies on RMA among Terrestrial Trophic Groups and Species

LIST OF TABLES (continued)

Table 4.1-9	Aldrin Statistical Results for Terrestrial Trophic Level Combinations on RMA in 1989
Table 4.1-10	Dieldrin Statistical Results for Terrestrial Trophic Level Combinations on RMA in 1989
Table 4.1-11	Endrin Statistical Results for Terrestrial Trophic Level Combinations on RMA in 1989
Table 4.1-12	DDT Statistical Results for Terrestrial Trophic Level Combinations on RMA in 1989
Table 4.1-13	DDE Statistical Results for Terrestrial Trophic Level Combinations on RMA in 1989
Table 4.1-14	Arsenic Statistical Results for Terrestrial Trophic Level Combinations on RMA in 1989
Table 4.1-15	Mercury Statistical Results for Terrestrial Trophic Level Combinations on RMA in 1989
Table 4.2-1	Aldrin Statistical Results for Aquatic Species on RMA in 1989
Table 4.2-2	Dieldrin Statistical Results for Aquatic Species on RMA in 1989
Table 4.2-3	Endrin Statistical Results for Aquatic Species on RMA in 1989
Table 4.2-4	DDT Statistical Results for Aquatic Species on RMA in 1989
Table 4.2-5	DDE Statistical Results for Aquatic Species on RMA in 1989
Table 4.2-6	Arsenic Statistical Results for Aquatic Species on RMA in 1989
Table 4.2-7	Mercury Statistical Results for Aquatic Species on RMA in 1989
Table 4.2-8	Summary of Detection Frequencies on RMA among Aquatic Trophic Groups and Species
Table 4.2-9	Aldrin Statistical Results for Aquatic Trophic Level Combinations on RMA in 1989
Table 4.2-10	Dieldrin Statistical Results for Aquatic Trophic Level Combinations on RMA in 1989
Table 4.2-11	Endrin Statistical Results for Aquatic Trophic Level Combinations on RMA in 1989
Table 4.2-12	DDT Statistical Results for Aquatic Trophic Level Combinations on RMA in 1989

LIST OF TABLES (continued)

Table 4.2-13	DDE Statistical Results for Aquatic Trophic Level Combinations on RMA in 1989
Table 4.2-14	Arsenic Statistical Results for Aquatic Trophic Level Combinations on RMA in 1989
Table 4.2-15	Mercury Statistical Results for Aquatic Trophic Level Combinations on RMA in 1989
Table 4.3-1	Analyte Concentrations ($\mu\text{g/g}$) of Intentional Samples Collected at Rocky Mountain Arsenal in 1988
Table 4.3-2	Analyte Concentrations ($\mu\text{g/g}$) of Fortuitous Samples collected at Rocky Mountain Arsenal in 1988

LIST OF FIGURES

VOLUME I

Figure 1.1-1	General Location of Rocky Mountain Arsenal
Figure 1.1-2	Primary Areas of Potential Contamination on Rocky Mountain Arsenal
Figure 2.2-1	Fixed On-Site Sampling Locations CMP Biota Program
Figure 2.2-2	Aquatic Foci and Sampling Locations for Biota on RMA
Figure 3.1-1	Location of Off-Post Control Areas for More Mobile Species
Figure 3.1-2	Contamination Foci on Rocky Mountain Arsenal
Figure 3.2-1	Biota Sampling Location, Staked Site BS1-1
Figure 3.2-2	Biota Sampling Location, Staked Site BS3-4
Figure 3.2-3	CMP-BSA 1, RMA
Figure 3.2-4	CMP-BSA 2, RMA
Figure 3.2-5	CMP-BSA 3, RMA
Figure 3.2-6	CMP-BSA 4, RMA
Figure 3.2-7	CMP-BSA 5, RMA
Figure 3.2-8	CMP-BSA 11, RMA
Figure 3.2-9	CMP-BSA 12, RMA
Figure 3.2-10	CMP-BSA 13, RMA, Administration Area
Figure 3.2-11	Aquatic Sampling Foci, CMP-BSA 6, Lake Mary, RMA
Figure 3.2-12	Aquatic Sampling Foci, CMP-BSA 7, Ladora Lake, RMA
Figure 3.2-13	Aquatic Sampling Foci, CMP-BSA 8, Lower Derby Lake, RMA
Figure 3.2-14	Aquatic Sampling Foci, CMP-BSA 9, Rod & Gun Club Pond, RMA
Figure 3.2-15	Aquatic Sampling Foci, CMP-BSA 10, Upper Derby Lake, RMA
Figure 3.2-16	CMP Biota Sampling Sample Tag Form, 1988-1989
Figure 3.2-17	CMP Biota Sampling Chain of Custody Record Form, 1988-1989
Figure 3.2-18	CMP Biota Sampling Field Data Form, 1988-1989

LIST OF FIGURES (continued)

VOLUME II

Figure 4.1-1 to Figure 4.1-13	Analyte Concentrations vs. Study Site (for Terrestrial Species)
Figure 4.1-14 to Figure 4.1-22	Analyte Concentrations vs. Terrestrial Species (for Study Area)
Figure 4.2-1 to Figure 4.2-13	Analyte Concentrations vs. Study Site (for Aquatic Species)
Figure 4.2-14 to Figure 4.2-17	Analyte Concentrations vs. Aquatic Species (for Study Area)
Figure 4.3-1	Analyte Concentrations vs. Species, Residual, Intentional Samples Collected Under the 1988 Biota CMP
Figure 4.3-2	Analyte Concentrations vs. Species, Fortuitous Herbivores/Omnivores at RMA Collected Under the 1988 Biota CMP
Figure 4.3-3	Analyte Concentrations vs. Species, Fortuitous Carnivores at RMA Collected Under the 1988 Biota CMP

GLOSSARY OF ACRONYMS AND TERMS

• SPECIES CODES AND NAMES

ACRI = Grasshopper
ANDI = Blue-winged Teal
ANPL = Mallard
AQCH = Golden Eagle
ATCU = Burrowing Owl
BRTE = Cheatgrass
BUJA = Red-tailed Hawk
BURE = Ferruginous Hawk
BUSW = Swainson's Hawk
BUVI = Great Horned Owl
CEDE = Coontail
CHVO = Killdeer
COLE = Ground Beetle
CYLU = Black-tailed Prairie Dog
ESLU = Northern Pike
EUCY = Brewer's Blackbird
FASP = American Kestrel
FUAM = American Coot
HALE = Bald Eagle
HEAN = Sunflower
ICME/ICNE = Black and Brown Bullhead
ICPU = Channel Catfish
KOIR = Kochia
LEMA = Bluegill
LASE = Prickly Lettuce
MISA = Largemouth Bass
ODHE = Mule Deer
OLIG = Earthworm
PEMA = Deer Mouse
PHCO = Pheasant
PIME = Bull Snake
PIPI = Black-billed Magpie
PLAN = Plankton
POND = American Pondweed
POPE = Sego Pondweed
SPTR = Thirteen-lined Ground Squirrel
STNE = Western Meadowlark
STVU = Starling
SYAU = Desert Cottontail
TATA = Badger
TUMI = American Robin
ZEMA = Mourning Dove

• TROPHIC GROUPS

Terrestrial Groups

TPPR = Terrestrial Primary Producers
THER = Terrestrial Herbivores
TOMN = Terrestrial Omnivores
TCAR = Terrestrial Carnivores
TDET = Terrestrial Detritivores

Aquatic Groups

APPR = Aquatic Primary Producers
APCO = Aquatic Primary Consumers
AWCO = Aquatic Water Column Omnivores
APCA = Aquatic Primary Carnivores
ATCA = Aquatic Top Carnivores
ABFO = Aquatic Bottom Feeding Omnivores

• OTHERS

ANOVA = Analysis of variance
ARMY = U.S. Army
BCRL = below lower certified reporting limit
BCCI = College Lake Control Area
BCML = McKay Reservoir Control Area
BCRM-1 = Control Site 1 on RMA
BCSP = Sawhill Ponds Control Area
BCTL = Trilby Lateral Control Area
BCTR = Tamarack Ranch Control Area
BCWP = Walden Ponds Control Area
BCWR = Wellington Wildlife Refuge Control Area
BS1-3 = Staked Site 3 in BSA 1
BS12-C25 = Collection location in BSA 12, outside a staked site, in Section 25
BURM-30 = Collection location outside a BSA, on RMA, in Section 30
BDMS = Biota Data Management System
BSA = Biota Study Area
BSA1 = Most of Section 36 (Basin A)
BSA2 = Portions of Section 26 and 35 (Basin C and Basin F)
BSA3 = Portions of Section 35 and 2 (Sand Creek Lateral)
BSA4 = Portions of Section 35 and 2 (South Plants)
BSA5 = Portions of Section 3, 2, 1, 6, 11, 12 (RMA Lakes)
C = Control
CARS = Contamination Assessment Reports
CDOW = Colorado Division of Wildlife
CMP = Comprehensive Monitoring Program
cm/yr = centimeters per year
CPS-1 = Radian's Contour Plotting System 1
CRL = Certified Reporting Limit
DBCP = dibromochloropropane
DDE = dichlorodiphenylethane
DDT = dichlorodiphenyl trichloroethane
EBASCO = Ebasco Environmental Services Inc.
EC = electrical conductivity
ECD = Electron Capture Detection
ESE = Environmental Science and Engineering
°F = Fahrenheit
F = Far
FS = feasibility study
ft = foot
FY = Fiscal Year
g = grams
GC = Gas Chromatography

GLOSSARY OF ACRONYMS AND TERMS

geometric mean = U.S. Fish & Wildlife Service
geometric mean
GPC = Gel Permeation Chromatograph
GT = greater than
ha = hectare
HASP = Health and Safety Plan
HEP = Habitat Evaluation Procedure
in = inches
IRDMS - Installation Restoration Data Management
System
Kd = soil/water partition coefficient
Koc = percent of organic carbon
Kow = octanol/water partition coefficient
KWT = Kruskal-Wallis Test
LC50 = chemical concentration at which 50% of test
organisms expire
 $\mu\text{g/g}$ = microgram per gram
 μl = microliter
m = meter
MKE = Morrison-Knudsen Engineers
mi = miles
mph = miles per hour
MRI = Midwest Research Institute
msl = mean sea level
N = Near
NAS = National Academy of Sciences - National
Academy of Engineering
NCP = national Contingency Plan
NOAA = National Oceanic and Atmospheric
Administration
NP = North Plants
NRDA = national resource damage assessment
OCP = organochlorine pesticide
OVA = organic vapor analyzer
PMRMA = Program Manager RMA
PPE = personal protective equipment
ppb = parts per billion
QA/QC = Quality Assurance/Quality Control
RI = remedial investigation
RIC = RMA Resource Information Center
RI/FS = remedial investigation/feasibility study
RMA = Rocky Mountain Arsenal
RPD = relative percent difference
SARS = RMA Study Area Report
SCBA = self-contained breathing apparatus
SCS = U.S.D.A. Soil Conservation Service
Shell - Shell Chemical Company
teratogens = chemicals that cause embryonic defects
TSP = trisodium phosphate
TSY = Toxic Storage Yard
UCRL = Upper Certified Reporting Limit
USAEWES = U.S. Army Engineers Waterways
Experiment Station
USATHAMA = U.S. Army Toxic and Hazardous
Materials Agency
USDI = U.S. Department of the Interior
USEPA = U.S. Environmental Protection Agency
USFWS = U.S. Fish and Wildlife Service

4.0 RESULTS AND ANALYSIS OF CHEMICAL ANALYTICAL DATA FROM THE 1989 BIOTA MONITORING PROGRAM

The chemical analytical data from the 1989 Biota CMP are presented below in two sections. Section 4.1 provides the results of the chemical analyses for terrestrial species, presenting the analytes detected and describing their taxonomic and geographic distribution. Section 4.2 provides the same information for aquatic species sampled on RMA. For each of these ecosystems, results are presented first by analyte. The data and descriptive statistics on aldrin are followed in turn by data on dieldrin, endrin, DDT, DDE, arsenic, and mercury. Results are then summarized by species, with focus on the number and magnitude of detections in each species and in trophic level combinations of species. Finally, results are summarized geographically by BSA and, when appropriate, staked site or sampling focus. The final results section (Section 4.3) presents data on miscellaneous 1988 samples not analyzed until 1989 and on all of the fortuitous samples analyzed in 1988 or 1989, but collected in 1988.

Printouts of the IRDMS data (BIOTAYR2.DBF file) and the field data form information (BIODATA.DBF file) are provided as Appendices A and B, respectively. These data are also provided on personal computer diskette. The appended data provide detailed information on each sample collected. The data presented in the appendices and Section 4.1 have not been normalized for percent moisture or percent lipid (animal tissue only) to facilitate comparison with Biota RI data and other data collected prior to the CMP program. However, percent moisture and percent lipid data are provided as Lotus files (MRI.TXT and ESE.TXT) on the personal computer diskette as part of Appendix B.

In the sections that follow, comparisons of data sets are made using qualifiers such as "lower", "higher", "more", "less", etc. None of these qualifiers should be construed to denote statistically significant differences between data sets.

Comparative statistical analyses will be addressed in the 1990 Biota CMP Annual and Summary Report for the following reasons. The food web at RMA is assumed to be in equilibrium with the available abiotic and biotic sources of contamination. Thus, the rate of change of contaminant concentrations in the food web is expected to be slow. This expectation is supported by the 1988 Biota CMP Annual Report in which differences in analyte concentrations between 1986 Biota RI and 1988 Biota CMP data were not significant for most species tested. Additionally, the statistical

comparisons of analyte concentrations with respect to geographic areas, in the 1988 Biota CMP Annual Report, excluded many study areas and species due to small sample sizes. By deferring comparative statistical analyses to 1990, this problem can be overcome by combining samples of the same species from the same study areas, irrespective of time. This will maximize the effectiveness of these comparisons, the likelihood that changes through time will be apparent, and provide a more reliable perspective on data interpretation.

4.1 Chemical Results for Terrestrial Species

Results of the chemical analysis of the terrestrial samples are presented first (Section 4.1.1), followed by the distribution of target analytes within terrestrial species (Section 4.1.2) and terrestrial BSAs (Section 4.1.3). OCP data on sunflowers were not available for inclusion in this report due to delays resulting from the laboratory certification process.

4.1.1 Target Analytes in Terrestrial Species.

Chemical results for intentional (particular species that were planned to be collected) terrestrial species are presented in detail by analyte. A table for each analyte (Table 4.1-1 through Table 4.1-7) provides the total number of samples, the total number of detections above the lower certified reporting limit (CRL), for example "hits", and descriptive statistics (maximum concentration, minimum concentration, USFWS geometric mean, geometric variance, and geometric standard deviation) based on the total number of samples according to the USFWS method of calculation (Appendix C). The species summaries that follow are supported by bar graphs showing for each species all analytes detected and the location of the detection (Figures 4.1-1 through 4.1-13). A summary of detection frequencies (Table 4.1-8) and descriptive statistics (Tables 4.1-9 through 4.1-15) are also provided for the combinations of species in trophic levels. Finally, geographic summaries by BSA are supported by bar graphs (Figures 4.1-14 through 4.1-22). Refer to the Glossary following the List of Figures for a legend of acronyms used in the figures and tables.

4.1.1.1 Aldrin. - Aldrin was infrequently detected in terrestrial biota in RMA BSAs, and was not detected in samples from the near peripheral area or from control areas (Table 4.1-1). Overall, aldrin was detected in 10 of the 236 (4.2 percent) terrestrial samples analyzed from RMA BSAs and in none of the 52 control samples. Nine detections of 134 (6.7 percent) samples were for sedentary

species, while one detection of 102 (1.0 percent) samples was for a mobile species. Detected concentrations ranged from a minimum of 0.016 $\mu\text{g/g}$ in a beetle sample collected from BSA 2 to a maximum of 2.2 $\mu\text{g/g}$ in a deer mouse sample collected from BSA 4.

Aldrin residues were detected in RMA-BSA samples of the following species: beetles (three of eight), deer mouse (three of 28), mourning dove (one of 38), earthworm (one of 24), kochia (one of 17), and cheatgrass (one of 26). Aldrin detections occurred in BSAs 1,2,3,4, and 12. The highest frequency of detections within a BSA was one of 13 samples (7.7 percent) recorded at BSA 12. USFWS geometric mean concentrations were calculated for cheatgrass in BSA 12 (0.046 $\mu\text{g/g}$), for beetles in BSA 2 (0.011 $\mu\text{g/g}$), and for deer mice in BSA 3 (0.055 $\mu\text{g/g}$).

4.1.1.2 Dieldrin. - Dieldrin was the most frequently detected analyte in terrestrial biota during the 1989 field program (Tables 4.1-2 and 4.1-8). Residues of this chemical were detected in all BSAs, the near peripheral area, and in all analyzed terrestrial species sampled on RMA. Dieldrin was also detected in two of the 52 (3.8 percent) terrestrial control samples. The analyte was detected in 148 of the 231 (64 percent) analyzed terrestrial samples from BSAs and near peripheral areas. Dieldrin was detected in 72 of 130 (55 percent) sedentary species samples and in 76 of 101 (75 percent) mobile species samples. Dieldrin detections ranged from a low of 0.020 $\mu\text{g/g}$ in a black-tailed prairie dog sample from BSA 2 to a maximum of 35 $\mu\text{g/g}$ in a deer mouse sample from BSA 4.

In BSA 1, Basin A, dieldrin was detected in 29 of the 39 (74 percent) samples analyzed for that chemical. This chemical was present in sedentary species (15 of 23 samples, 65 percent) from this BSA less frequently than in mobile species (14 of 16 samples, 88 percent). Dieldrin was detected in vegetation with a frequency less than that in invertebrates, birds, and small mammals. USFWS geometric mean dieldrin concentrations in vegetation were lower than USFWS geometric mean concentrations in 80 percent of the other terrestrial species. The only calculated USFWS geometric mean dieldrin concentration in BSA 1 vegetation was 0.056 $\mu\text{g/g}$ in cheatgrass. Dieldrin was detected in one of three kochia samples collected in BSA 1 at a concentration of 0.085 $\mu\text{g/g}$. A substitute species, prickly lettuce, contained dieldrin in one of the three samples analyzed at a concentration of 0.063 $\mu\text{g/g}$.

Species in BSA 1 with 100 percent detections included three beetle samples (range = 0.13 to 3.8 $\mu\text{g/g}$, USFWS geometric mean = 0.56 $\mu\text{g/g}$), 10 black-tailed prairie dog samples (range = 0.062 to 0.25 $\mu\text{g/g}$, USFWS geometric mean = 0.13 $\mu\text{g/g}$), two earthworm samples (range = 0.33 to 0.68 $\mu\text{g/g}$, USFWS geometric mean = 0.47 $\mu\text{g/g}$), and three deer mouse samples (0.58 to 11 $\mu\text{g/g}$,

USFWS geometric mean = 3.4 $\mu\text{g/g}$). Dieldrin was detected in four of six mourning doves at concentrations ranging from 0.033 to 8.0 $\mu\text{g/g}$ (USFWS geometric mean = 0.049 $\mu\text{g/g}$). Residues of this chemical occurred in two of five grasshopper samples at concentrations of 0.48 and 0.54 $\mu\text{g/g}$. The maximum concentration of dieldrin detected in BSA 1 was 11 $\mu\text{g/g}$ in a deer mouse sample. This species also had the highest USFWS geometric mean concentration (3.4 $\mu\text{g/g}$) in the BSA.

In BSA 2, dieldrin was detected in 40 of the 52 (77 percent) samples analyzed for that chemical. As for BSA 1, mobile species had higher dieldrin detection frequencies (25 of 27 samples, 93 percent) than did sedentary species (15 of 25 samples, 60 percent). Dieldrin concentrations in vegetation were generally lower than in animal tissues. Two of five cheatgrass samples had detected concentrations of 0.064 and 0.069 $\mu\text{g/g}$. Dieldrin was not detected in samples of the other two plant species analyzed.

Sedentary species in BSA 2 with 100 percent dieldrin detections were three beetle samples (range = 1.4 to 2.2 $\mu\text{g/g}$, USFWS geometric mean = 1.7 $\mu\text{g/g}$), three earthworm samples (range = 0.19 to 3.6 $\mu\text{g/g}$, USFWS geometric mean = 0.93 $\mu\text{g/g}$), and four deer mouse samples (range = 0.30 to 2.0 $\mu\text{g/g}$, USFWS geometric mean = 0.71 $\mu\text{g/g}$). The other sedentary species collected in this BSA, grasshoppers, had dieldrin detections in three of five samples (range = 0.092 to 0.41 $\mu\text{g/g}$, USFWS geometric mean = 0.046 $\mu\text{g/g}$). Mobile species with 100 percent detections were seven ring-necked pheasant samples consisting of four dressed carcass samples (range = 0.089 to 0.20 $\mu\text{g/g}$, USFWS geometric mean = 0.13 $\mu\text{g/g}$) and three liver samples (range = 0.87 to 0.93 $\mu\text{g/g}$, USFWS geometric mean = 0.89 $\mu\text{g/g}$). All five western meadowlark samples also contained detectable concentrations of this analyte (range = 0.037 to 1.6 $\mu\text{g/g}$, USFWS geometric mean = 0.14 $\mu\text{g/g}$). The other mobile species collected in this BSA were black-tailed prairie dogs and mourning doves. Six of seven black-tailed prairie dog samples (range = 0.02 to 0.19 $\mu\text{g/g}$, USFWS geometric mean = 0.054 $\mu\text{g/g}$), and seven of eight mourning dove samples (range = 0.097 to 3.8 $\mu\text{g/g}$, USFWS geometric mean = 0.44 $\mu\text{g/g}$) evidenced detections for this analyte. The maximum concentration of dieldrin detected in BSA 2 was 3.8 $\mu\text{g/g}$ in a mourning dove. Beetle samples, however, had the highest USFWS geometric mean concentration (1.7 $\mu\text{g/g}$) in the BSA.

In BSA 3, dieldrin was detected in 31 of the 39 (79 percent) samples analyzed. As for BSAs 1 and 2, mobile species exhibited higher detection frequencies (18 of 21, 86 percent) than did sedentary species (13 of 18, 72 percent). Vegetation sample USFWS geometric mean concentrations were generally lower than animal sample USFWS geometric mean concentrations. Plant species with dieldrin detections were two of three cheatgrass samples (range = 0.087 to 0.12 $\mu\text{g/g}$, USFWS geometric mean = 0.034 $\mu\text{g/g}$) and two of two prickly lettuce samples (range = 0.12 to 0.34 $\mu\text{g/g}$,

USFWS geometric mean = 0.20 $\mu\text{g/g}$). Neither of the two kochia samples analyzed had detectable concentrations of this analyte.

Other sedentary species samples with 100 percent dieldrin detections included four of four deer mouse samples (range = 0.33 to 9.1 $\mu\text{g/g}$, USFWS geometric mean = 3.0 $\mu\text{g/g}$). Additional sedentary species with detectable concentrations of this analyte were grasshoppers and earthworms. Three of four grasshopper samples (range = 0.34 to 1.6 $\mu\text{g/g}$, USFWS geometric mean = 0.21 $\mu\text{g/g}$) and two of three earthworm samples (range = 0.10 to 0.28 $\mu\text{g/g}$, USFWS geometric mean = 0.053 $\mu\text{g/g}$) had detectable concentrations of this analyte. Mobile species with 100 percent dieldrin detections were a burrowing owl sample (0.13 $\mu\text{g/g}$) and ring-necked pheasant samples. The pheasant detections consisted of two dressed carcass samples (range = 0.054 to 0.19 $\mu\text{g/g}$, USFWS geometric mean = 0.10 $\mu\text{g/g}$) and two liver samples (range = 0.46 to 0.46 $\mu\text{g/g}$, USFWS geometric mean = 0.46 $\mu\text{g/g}$). Other mobile species with detectable dieldrin concentrations were eight of ten black-tailed prairie dogs (range = 0.024 to 0.22 $\mu\text{g/g}$, USFWS geometric mean = 0.031 $\mu\text{g/g}$) and five of six mourning doves (range = 0.18 to 2.0 $\mu\text{g/g}$, USFWS geometric mean = 0.21 $\mu\text{g/g}$). As in several other BSAs, the greatest USFWS geometric mean concentration of dieldrin (3.0 $\mu\text{g/g}$) was in deer mice. This species also had the highest concentration of dieldrin detected in this BSA (9.1 $\mu\text{g/g}$).

In BSA 4, South Plants, dieldrin was detected with 70 percent frequency in all species collected (19 of 27 samples). The dieldrin detection frequencies for sedentary species (12 of 16 samples, 75 percent) were higher than for mobile species (seven of 11 samples, 64 percent), in contrast with other BSAs. Dieldrin concentrations in vegetation were generally lower than in animal samples. Two of three cheatgrass samples had dieldrin detections (range = 0.072 to 0.16 $\mu\text{g/g}$, USFWS geometric mean = 0.035 $\mu\text{g/g}$) and one of two prickly lettuce samples had a detection (0.074 $\mu\text{g/g}$).

Other sedentary species with 100 percent dieldrin detections were the earthworm and the deer mouse. Three earthworm samples had detections (range = 0.18 to 2.0 $\mu\text{g/g}$, USFWS geometric mean = 0.64 $\mu\text{g/g}$), and four deer mouse samples had detections (range 4.9 to 35 $\mu\text{g/g}$, USFWS geometric mean = 10 $\mu\text{g/g}$). The additional sedentary species collected in this BSA, grasshoppers, had detections in two of four samples (range = 0.27 to 0.69 $\mu\text{g/g}$, USFWS geometric mean = 0.048 $\mu\text{g/g}$). The only mobile species collected in this BSA was the mourning dove. Seven of 11 mourning doves had detectable concentrations of dieldrin (range = 0.075 to 1.7, USFWS geometric mean = 0.053 $\mu\text{g/g}$). The highest dieldrin value verified in a deer mouse sample from this BSA (35 $\mu\text{g/g}$) was also the highest concentration for any sample analyzed for the 1989 Biota CMP. The highest USFWS geometric mean concentration in this BSA (10 $\mu\text{g/g}$) was also in this species.

In BSA 5, dieldrin was detected in 16 of 37 samples (43 percent). Sedentary species had slightly lower detection frequencies (11 of 26 samples, 42 percent) than mobile species (5 of 11 samples,

45 percent). This analyte was detected in only one of the three vegetation species collected for analysis, cheatgrass. Two of five cheatgrass samples both had detections of 0.15 $\mu\text{g/g}$. Other sedentary species with detectable concentrations of dieldrin were beetles, earthworms, and the deer mouse. Two of two beetle samples had dieldrin detections (range = 0.22 to 1.2 $\mu\text{g/g}$, USFWS geometric mean = 0.52 $\mu\text{g/g}$). Four of five earthworm samples contained detectable concentrations of this analyte (range = 0.34 to 2.7 $\mu\text{g/g}$, USFWS geometric mean = 0.26 $\mu\text{g/g}$), as did three of five deer mouse samples (range = 0.13 to 2.4 $\mu\text{g/g}$, USFWS geometric mean = 0.082 $\mu\text{g/g}$). Mobile species with detectable concentrations of dieldrin collected from this BSA consisted of ring-necked pheasants and mourning doves. Two of three pheasant dressed carcass samples had detections (range = 0.16 to 4.8 $\mu\text{g/g}$, USFWS geometric mean = 0.095 $\mu\text{g/g}$), and two of three pheasant liver samples had detections (range = 0.42 to 6.0 $\mu\text{g/g}$, USFWS geometric mean = 0.14 $\mu\text{g/g}$). One of five mourning doves contained dieldrin at a concentration of 0.024 $\mu\text{g/g}$. The highest USFWS geometric mean dieldrin concentration detected in BSA 5 was 0.52 $\mu\text{g/g}$ in a beetle sample. The maximum concentration of dieldrin in the BSA (6.0 $\mu\text{g/g}$) was in a pheasant liver sample.

In BSA 11, dieldrin was detected in two of 17 samples (12 percent) analyzed. Both detections were within the ten earthworm samples (range = 0.088 to 0.11 $\mu\text{g/g}$, USFWS geometric mean = 0.99 $\mu\text{g/g}$).

In BSA 12, dieldrin was detected in eight of 13 samples (62 percent) analyzed. Three of eight (38 percent) sample detections were for sedentary species, while all five mobile species samples had detections. The sedentary species with analyte detections were earthworms and deer mice. Both earthworms samples had detections (range = 0.54 to 0.66 $\mu\text{g/g}$, USFWS geometric mean = 0.59 $\mu\text{g/g}$), and one of two deer mouse samples had a hit of 0.11 $\mu\text{g/g}$. The mobile species with analyte detections were the black-tailed prairie dog and the mourning dove. Three of three prairie dog samples had detections (range = 0.030 to 0.12 $\mu\text{g/g}$, USFWS geometric mean = 0.052 $\mu\text{g/g}$), and two of two mourning doves had detections (range = 0.050 to 1.5 $\mu\text{g/g}$, USFWS geometric mean = 0.28 $\mu\text{g/g}$). The highest USFWS geometric mean concentration in BSA 12 was 0.59 $\mu\text{g/g}$ in the earthworm, while a mourning dove sample had the maximum detected concentration of 1.52 $\mu\text{g/g}$.

In BSA 13, one of four earthworm samples analyzed for dieldrin had a detection of 0.16 $\mu\text{g/g}$.

Within the near peripheral area, which is within one-half mile of the outer boundary of all BSAs combined, the one ring-necked pheasant specimen had a dieldrin liver sample detection of 0.045 $\mu\text{g/g}$, but dieldrin was not detected in the dressed carcass of this bird. The one burrowing owl sample had a detected concentration of 0.11 $\mu\text{g/g}$.

Dieldrin was also detected in two of the 52 samples analyzed from control areas. Two of three beetle samples contained detectable concentrations of this analyte (range = 0.034 to 0.037 $\mu\text{g/g}$, USFWS geometric mean = 0.011 $\mu\text{g/g}$).

4.1.1.3 Endrin. - Endrin was infrequently detected in either terrestrial sedentary (10 of 130 samples, 7.7 percent) or mobile species (11 of 102 samples, 11 percent) on RMA (Table 4.1-3). This chemical was detected in 21 of the 232 (9.1 percent) samples analyzed from RMA BSAs, and in none of the 52 samples analyzed from control areas. Detected concentrations ranged from a minimum of 0.053 $\mu\text{g/g}$ for a mourning dove from BSA 3 to a maximum of 0.98 $\mu\text{g/g}$ for a grasshopper sample from BSA 5. Endrin was detected in all collection areas except BSA 11, BSA 13 and the near peripheral area.

In BSA 1, endrin was detected in 10 percent (4 of 41) of the samples, with the greater percentage of the detections being in samples of sedentary species (three of 25, 12 percent) rather than in samples of mobile species (one of 16, 6.3 percent). Detected concentrations were in one of five grasshopper samples at a concentration of 0.16 $\mu\text{g/g}$, in one of three beetle samples at a concentration of 0.24 $\mu\text{g/g}$, in one of five deermouse samples at a concentration of 0.093 $\mu\text{g/g}$, and in one of six mourning dove samples at a concentration of 0.22 $\mu\text{g/g}$.

In BSA 2, endrin was detected in 19 percent (10 of 53) of the samples, with detections in mobile species (six of 28, 21 percent) being slightly more frequent than in sedentary species (four of 25, 16 percent). Detected concentrations were in three of three beetle samples, with concentrations ranging from 0.065 to 0.098 $\mu\text{g/g}$ (USFWS geometric mean = 0.077 $\mu\text{g/g}$). One of two earthworm samples had an endrin detection of 0.56 $\mu\text{g/g}$. Six of eight mourning doves had endrin detections ranging from 0.073 to 0.34 $\mu\text{g/g}$ (USFWS geometric mean = 0.043 $\mu\text{g/g}$).

In BSA 3, endrin was detected only in mourning doves. Two of six samples analyzed had concentrations of 0.053 and 0.10 $\mu\text{g/g}$. These detections comprised 5 percent of the 40 samples collected in the BSA, and 10 percent of the 21 mobile samples collected there.

In BSA 4, endrin was detected in one of four grasshopper samples (0.23 $\mu\text{g/g}$) and one of 11 mourning dove samples (0.25 $\mu\text{g/g}$). These detections comprised 7 percent of the 27 samples collected in BSA 4, 90 percent of the 11 mobile samples, and 6 percent of the total of 16 sedentary samples collected.

In BSA 5, endrin was detected in one of three grasshopper samples (0.98 $\mu\text{g/g}$) and one of five cheatgrass samples (0.096 $\mu\text{g/g}$). These detections comprised 5.4 percent of the 37 samples collected in the BSA and 7.7 percent of the 26 sedentary samples collected.

In BSA 12, endrin was detected only in one of two mourning dove samples at a concentration of 0.078 $\mu\text{g/g}$. Overall 9.1 percent of the 11 samples collected in this BSA contained detected concentrations of endrin.

4.1.1.4 DDT. - DDT was infrequently detected in biota on RMA in 1989. It was detected in 14 of the 236 (5.9 percent) RMA BSA samples and in only one of the 52 control samples analyzed in 1989 (1.9 percent). The single control detection was in an earthworm sample, which had an analyzed concentration of 0.15 $\mu\text{g/g}$. Thirteen DDT detections occurred in 134 (9.7 percent) sedentary species samples and one detection occurred in 102 (1.0 percent) mobile species samples. Overall, detected concentrations of DDT ranged from a minimum of 0.091 $\mu\text{g/g}$ in a kochia sample collected from BSA 2 to a maximum of 0.27 $\mu\text{g/g}$ in a deer mouse collected from BSA 1.

In BSA 1, DDT was detected in one of two earthworm samples (0.26 $\mu\text{g/g}$) and two of five deer mouse samples (0.15 and 0.27 $\mu\text{g/g}$).

In BSA 2, DDT was detected in one of five grasshopper samples (0.14 $\mu\text{g/g}$) and one of four kochia samples (0.091 $\mu\text{g/g}$).

In BSA 3, DDT was detected in one of 10 prairie dog samples (0.16 $\mu\text{g/g}$).

In BSA 4, DDT was detected in one of four grasshopper samples (0.18 $\mu\text{g/g}$).

In BSA 5, DDT was detected in one of five cheatgrass samples (0.12 $\mu\text{g/g}$) and two of five earthworm samples at concentrations of 0.16 and 0.18 $\mu\text{g/g}$.

In BSA 11, DDT was detected in the only grasshopper sample (0.13 $\mu\text{g/g}$) collected.

In BSA 12, DDT was detected in one of two cheatgrass samples (0.12 $\mu\text{g/g}$).

In BSA 13, DDT was detected in two of four earthworm samples at concentrations of 0.13 and 0.14 $\mu\text{g/g}$ (USFWS geometric mean = 0.011 $\mu\text{g/g}$).

4.1.1.5 DDE. - DDE was also infrequently detected in RMA biota (Table 4.1-5). DDE was detected in 15 of the 236 (6.4 percent) samples analyzed from RMA BSAs. DDE was not detected in near peripheral area samples or in any of the 52 samples analyzed from control areas. It was detected in both sedentary (nine of 134, 6.7 percent) and mobile species (six of 102, 5.9 percent). Overall, the detected DDE concentrations ranged from a minimum of 0.069 $\mu\text{g/g}$ in a cheatgrass sample from BSA 5 to a maximum of 1.9 $\mu\text{g/g}$ in a deer mouse sample from BSA 4. DDE was not detected in BSAs 1 and 11.

In BSA 2, DDE was detected only once, in one of the three earthworm samples (0.17 $\mu\text{g/g}$) analyzed.

In BSA 3, DDE was detected twice, once in a burrowing owl (0.076 $\mu\text{g/g}$), and in one of two ring-necked pheasant liver samples (0.11 $\mu\text{g/g}$), but not in the dressed carcasses, which were also analyzed.

In BSA 4, DDE was detected three times, in one of three earthworm samples (0.68 $\mu\text{g/g}$), in one of four deer mouse samples (1.9 $\mu\text{g/g}$), and in one of 11 mourning dove samples (0.077 $\mu\text{g/g}$).

In BSA 5, DDE was detected in five of 37 samples (14 percent). This analyte was detected in one of five cheatgrass samples (0.069 $\mu\text{g/g}$), one of two beetle samples (0.36 $\mu\text{g/g}$), and one of five earthworm samples (1.3 $\mu\text{g/g}$). DDE was also detected in one of three ring-necked pheasant dressed carcass samples (0.070 $\mu\text{g/g}$), and in one of three pheasant liver samples (0.46 $\mu\text{g/g}$). These two pheasant samples came from the same specimen. The detections were slightly more frequent in samples of mobile species (two of 11 samples, 18 percent) than in samples of sedentary species (three of 26 samples, 12 percent).

In BSA 12, DDE was detected in one of two mourning dove samples (0.94 $\mu\text{g/g}$).

In BSA 13, DDE was detected in three of four earthworm samples at concentrations ranging from 0.43 to 0.61 $\mu\text{g/g}$ (USFWS geometric mean = 0.12 $\mu\text{g/g}$).

4.1.1.6 Arsenic. - Arsenic was detected in all BSAs and in control sites, but not in the near peripheral area. Arsenic was detected in samples of all terrestrial species except grasshoppers and three of the four bird species; it was detected in a single mourning dove sample. Arsenic was detected in 48 of the 259 (19 percent) samples analyzed from RMA BSAs and in six of the 58 (10 percent) samples analyzed from RMA control areas. On RMA, it was detected primarily in

sedentary species (42 of 157 samples, 27 percent), but also in mobile species (6 of 102 samples, 5.9 percent) as shown in Table 4.1-6. Overall, detected concentrations ranged from a minimum of 0.35 $\mu\text{g/g}$ for a kochia sample collected from BSA 1 to a maximum of GT 5.0 $\mu\text{g/g}$ for an earthworm sample collected from BSA 12. Earthworm samples had the highest frequency of detections of arsenic and also the maximum USFWS geometric mean (1.4 $\mu\text{g/g}$) calculated for this analyte.

In BSA 1, arsenic was detected in 27 percent (12 of 45) of the samples, with a greater frequency of detections in samples of sedentary species, (nine of 29 samples, 31 percent) than in samples of mobile species (three of 16 samples, 19 percent). Arsenic was detected in three of the three beetle samples, at concentrations ranging from 0.62 to 1.9 $\mu\text{g/g}$ (USFWS geometric mean = 1.0 $\mu\text{g/g}$). Arsenic was detected in one of the four sunflower samples at a concentration of 2.3 $\mu\text{g/g}$. The metal was detected in two of the three kochia samples (range = 0.35 to 0.42 $\mu\text{g/g}$, USFWS geometric mean = 0.26 $\mu\text{g/g}$). Arsenic was detected in two of two earthworm samples (range = 1.1 to 1.9 $\mu\text{g/g}$, USFWS geometric mean = 1.4 $\mu\text{g/g}$) and in one of five deer mouse samples at a concentration of 1.1 $\mu\text{g/g}$. Arsenic was also detected in three of the 10 black-tailed prairie dogs collected in BSA 1 with concentrations ranging from 0.43 to 0.58 $\mu\text{g/g}$.

In BSA 2, arsenic was detected in 14 percent (eight of 59) of the samples, with a greater frequency of detection in samples of sedentary species (six of 31 samples, 19 percent) than in samples of mobile species (two of 28 samples, 7.1 percent). Arsenic was detected in two of the three beetle samples, at concentrations ranging from 1.1 to 1.4 $\mu\text{g/g}$ (USFWS geometric mean = 0.58 $\mu\text{g/g}$). Arsenic was detected in one of the five cheatgrass samples (0.48 $\mu\text{g/g}$). Arsenic was detected in three of the three earthworm samples (range = 1.5 to 1.8 $\mu\text{g/g}$, USFWS geometric mean = 1.6 $\mu\text{g/g}$). Arsenic was detected in one of the eight black-tailed prairie dogs collected in BSA 2 at a concentration of 0.44 $\mu\text{g/g}$ and in one of eight mourning doves at a concentration of 2.6 $\mu\text{g/g}$.

In BSA 3, arsenic was detected in 9.1 percent (four of 44) of the samples, with a greater frequency of detection in samples of sedentary species (three of 23 samples, 13 percent) than in samples of mobile species (one of 21 samples, 4.8 percent). Arsenic was detected in three of three earthworm samples at concentrations ranging from 0.71 to 1.4 $\mu\text{g/g}$ (USFWS geometric mean = 1.0 $\mu\text{g/g}$) and in one of 10 black-tailed prairie dogs at a concentration of 0.52 $\mu\text{g/g}$.

In BSA 4, only earthworms and plants contained arsenic. The samples with detections comprised 19 percent of the 31 samples, 20 of which were of sedentary species. Three of the three earthworm samples contained arsenic detections at concentrations ranging from 0.68 to 3.5 $\mu\text{g/g}$ (USFWS geometric mean = 1.3 $\mu\text{g/g}$). Plant detections consisted of one of three cheatgrass samples, one of

four sunflower samples, and one of two prickly lettuce samples at concentrations of 0.60, 0.88, and 0.97 $\mu\text{g/g}$, respectively.

In BSA 5, only beetles and earthworms contained detectable concentrations of arsenic. The samples with detections comprised 15 percent of the 41 samples, 30 of which were sedentary species. One of the two beetle samples had an arsenic detection of 0.47 $\mu\text{g/g}$. All five earthworm samples contained arsenic, with concentrations ranging from 0.62 to 1.4 $\mu\text{g/g}$ (USFWS geometric mean = 0.95 $\mu\text{g/g}$).

In BSA 11, only earthworms had arsenic detections. Nineteen total samples and 12 sedentary samples were collected in this BSA. Two of two samples had detections of 1.6 and 2.1 $\mu\text{g/g}$ (USFWS geometric mean = 1.8 $\mu\text{g/g}$).

In BSA 12, the pattern of arsenic detection was similar to BSA 4, with detections for earthworms and plant species, but with an additional detection for one of two deer mouse samples (1.2 $\mu\text{g/g}$). The samples with detections comprised 46 percent of the 13 total samples, eight of which were of sedentary species. Two of two earthworm samples both contained concentrations of arsenic greater than (GT) 5.0 $\mu\text{g/g}$. Two of two cheatgrass samples had arsenic detections of 0.97 and 1.1 $\mu\text{g/g}$ (USFWS geometric mean = 1.0 $\mu\text{g/g}$). One of the two kochia samples had an arsenic detection of 0.33 $\mu\text{g/g}$.

In BSA 13, the Administration Area, the only intentional species collected was the earthworm. All four samples had arsenic detections ranging from 1.2 to 2.2 $\mu\text{g/g}$ (USFWS geometric mean = 1.5 $\mu\text{g/g}$).

4.1.1.7 Mercury. - Mercury was not detected often in terrestrial biota in 1989 (Table 4.1-7). Twenty-one of the 252 (8.3 percent) samples analyzed from RMA BSAs contained mercury, and two of the 55 (3.6 percent) control area samples also contained mercury. Mercury was detected in all of the BSAs except BSA 11 and the near peripheral area. Of all sedentary species investigated, only earthworms and deer mice contained detectable concentrations of mercury (20 of 157 samples, 13 percent), while one black-tailed prairie dog was the only mobile species exhibiting a detectable concentration (one of 95, 1.0 percent). Overall, the detected concentrations ranged from a minimum of 0.047 $\mu\text{g/g}$ for the black-tailed prairie dog, and an earthworm sample, collected from BSA 3 to a maximum of 0.81 $\mu\text{g/g}$ for a deer mouse sample collected from BSA 1. USFWS geometric mean concentrations were calculated only for earthworms, and equaled 0.045 $\mu\text{g/g}$ for RMA-BSAs, but ranged between 0.03 and 0.13 $\mu\text{g/g}$ for individual BSAs.

In BSA 1, mercury was detected in both of the earthworm samples analyzed, at concentrations of 0.11 and 0.14 $\mu\text{g/g}$ (USFWS geometric mean = 0.13 $\mu\text{g/g}$). Mercury was also detected in one of five deer mouse samples at a concentration of 0.81 $\mu\text{g/g}$.

In BSA 2, mercury was detected in three of the three earthworm samples, at concentrations ranging from 0.059 to 0.094 $\mu\text{g/g}$ (USFWS geometric mean = 0.072 $\mu\text{g/g}$). Mercury was also detected in one of five deer mouse samples at a concentration of 0.058 $\mu\text{g/g}$.

In BSA 3, mercury was detected in one of ten black-tailed prairie dog samples (.047 $\mu\text{g/g}$) and two of three earthworm samples (0.047 and 0.066 $\mu\text{g/g}$, USFWS geometric mean = 0.033 $\mu\text{g/g}$).

In BSAs 4 and 5, earthworms were the only species collected that contained detectable concentrations of mercury. Two of the three earthworm samples from BSA 4 contained mercury at concentrations of 0.067 $\mu\text{g/g}$ and 0.13 $\mu\text{g/g}$ (USFWS geometric mean = 0.047 $\mu\text{g/g}$). Three of the five samples collected from BSA 5 contained mercury at concentrations ranging from 0.069 to 0.082 $\mu\text{g/g}$ (USFWS geometric mean = 0.035 $\mu\text{g/g}$).

In BSA 12, mercury was detected in two of two earthworm samples at concentrations of 0.060 $\mu\text{g/g}$ and 0.12 $\mu\text{g/g}$ (USFWS geometric mean = 0.083 $\mu\text{g/g}$). Mercury was also detected in a deer mouse sample at a concentration of 0.34 $\mu\text{g/g}$.

In BSA 13, mercury was detected in three of four earthworm samples at concentrations ranging from 0.058 to 0.097 $\mu\text{g/g}$ (USFWS geometric mean = 0.048 $\mu\text{g/g}$).

4.1.2 Distribution of Target Analytes within Terrestrial Species Sampled

The pattern of detections varied markedly within the 13 terrestrial species sampled and analyzed for the seven Biota CMP target analytes. Figures 4.1-1 through 4.1-13 illustrate these patterns of detection on a species-by-species basis.

4.1.2.1 Terrestrial Species. - Four species of terrestrial plants were collected in BSAs and control areas on RMA: cheatgrass, kochia, prickly lettuce, and sunflower (Figures 4.1-1 through 4.1-4). Analytical results for sunflower samples were available only for metals; OCP data were not available for inclusion in this report. Of the first three plant species, prickly lettuce evidenced both the fewest hits and the lowest diversity of target analytes, but kochia had the lowest frequency of hits. Dieldrin and arsenic were detected in prickly lettuce. Cheatgrass evidenced the greatest

number and the highest frequency of hits of target analytes, the greatest variety of target analytes detected (all but mercury) and the widest geographic detection of target analytes. Neither kochia nor prickly lettuce were as effective as cheatgrass as a monitoring species. Cheatgrass was particularly effective as an indicator of the presence of dieldrin, with detections at staked sites in every BSA where it was collected except BSA 11 and BSA 12. Concentrations of dieldrin detected in cheatgrass ranged slightly higher than concentrations of this chemical in prickly lettuce with one exception. All four plant species evidenced detectable concentrations of arsenic; a sunflower sample contained the highest concentrations detected in a plant.

Of the three invertebrate species, earthworms, grasshoppers, and ground beetles (Figure 4.1-5 through Figure 4.1-7), earthworms had the highest frequency of detection for DDT, DDE, arsenic, and mercury. Beetles had the highest frequency of detection of aldrin, dieldrin, and endrin. They had the maximum detected concentration only for dieldrin, while earthworms had the highest aldrin and grasshoppers had the highest endrin. Earthworms had detectable concentrations of all target analytes, albeit only one aldrin detection. Beetles had detectable concentrations of five of the seven target analytes, with BCRL values for DDT and mercury. Given these considerations, earthworms were the most effective detectors of target analytes, followed by ground beetles.

The four bird species sampled, ring-necked pheasants, mourning doves, western meadowlarks, and burrowing owls all evidenced concentrations of dieldrin (Figure 4.1-8 through Figure 4.1-11). Dieldrin was the only analyte detected in western meadowlarks. The burrowing owl and pheasant also evidenced DDE; the mourning dove contained aldrin, endrin, and arsenic, as well. Both dieldrin and DDE were detected at a highest frequency in the owl, but at higher maximum concentrations in the dove. Thus, mourning doves were the most effective avian indicators of the target analytes. Pheasants are the next most effective indicator, since even though their frequency of detections was less, the detected values and the population available for sampling were greater.

Two species of mammals were sampled under the 1989 CMP Biota Monitoring Program, a sedentary species (deer mouse) and a mobile species (black-tailed prairie dog). Deer mouse samples had detected concentrations of all target analytes and had the greatest frequency of detection of all but dieldrin and arsenic. Deer mice had higher maximum concentrations than prairie dogs for all the target analytes detected in both species. Deer mice were an especially good indicator of dieldrin and were clearly the most effective mammalian indicator of the target analytes.

Overall, cheatgrass, earthworms, mourning doves and deer mice provided the most effective evidence of the target analytes among the terrestrial samples collected on RMA, based on concentration levels, number of analytes detected, percentage of detections, and geographic distribution of detections. Earthworm samples had the greatest percentage of hits when all target analytes are viewed collectively. Earthworm samples provided 46 percent of a possible 164 hits. Of the total possible hits, deer mice provided 17 percent, mourning doves 15 percent, and cheatgrass 12 percent. Ground beetles (39 percent), burrowing owls (21 percent), Black-tailed prairie dogs (16 percent), western meadowlarks (14 percent), and ring-necked pheasants (11 percent) also provided above 10 percent of the possible target analyte hits.

When the analytes are considered independently, earthworms provided the greatest percentage of possible hits in RMA-contaminated areas for DDT (21 percent), DDE (21 percent), arsenic (100 percent), and mercury (71 percent). Ground beetles provided the greatest percentage of available hits for aldrin (38 percent) and endrin (50 percent); while ground beetles, western meadowlarks, and burrowing owls all had 100 percent of the available hits for dieldrin. However, other than for earthworms, these greatest percentages were based on sample sizes of eight or fewer. Larger sample sizes with 75 percent or greater dieldrin detection frequencies, for example deer mice or prairie dogs, may be just as effective as indicators.

Deer mouse samples recorded the maximum program concentrations for dieldrin (35 $\mu\text{g/g}$ in BSA 4), aldrin (2.2 $\mu\text{g/g}$ in BSA 4), DDT (0.27 $\mu\text{g/g}$ in BSA 1), DDE (1.9 $\mu\text{g/g}$ in BSA 4), and mercury (0.81 $\mu\text{g/g}$ in BSA 1). The maximum concentration of endrin (0.98 $\mu\text{g/g}$ in BSA 5) was recorded for a grasshopper sample. The maximum concentration of arsenic detected was GT 5.0 $\mu\text{g/g}$ in an earthworm sample from BSA 12.

4.1.2.2 Terrestrial Trophic Groups. - To address contaminant behavior as a function of trophic level position for the Biota CMP species sampled, these species were placed in five terrestrial trophic groupings:

- TPRR - Primary Producers: cheatgrass, sunflower (1989 sunflower samples not analyzed for OCPs for this report), kochia, and prickly lettuce
- THER - Herbivores: grasshopper, black-tailed prairie dog, and mourning dove
- TOMN - Omnivores: deer mouse, ring-necked pheasant, western meadowlark, and beetles

- TCAR - Carnivores: burrowing owl
- TDET - Detritivores: earthworm

Table 4.1-8 describes detection frequencies within CMP-BSAs for individual species belonging to a particular trophic group. The presentation sums the total number of detected concentrations by species and by analyte for a particular trophic group. Tables 4.1-9 through 4.1-15 then provide, by analyte, the descriptive statistics for each of the five terrestrial trophic groups.

Thirty-one percent of all primary producer samples from RMA-contaminated areas contained dieldrin, which was present in all primary producer species. All other analytes, except mercury, were present in this trophic level at frequencies ranging from 1.9 to 13 percent. Of the four terrestrial primary producers, cheatgrass showed the greatest propensity to accumulate contaminants. No target analytes were detected among the primary producer control samples.

Sixty-nine percent of all herbivore samples from RMA-contaminated areas contained dieldrin (USFWS geometric mean = $0.056 \mu\text{g/g}$), which was present in all herbivore species. All of the other analytes were detected in herbivore samples at frequencies ranging from 1.1 to 15 percent. Of the three terrestrial herbivores, mourning doves showed the greatest propensity to accumulate contaminants. Black-tailed prairie dogs were nearly as effective at evidencing contaminants. Arsenic was the only target analyte detected among the herbivore control samples at a frequency of 10 percent.

Seventy-six percent of all omnivore samples from RMA-contaminated areas contained dieldrin (USFWS geometric mean = $0.18 \mu\text{g/g}$), which was present in all omnivore species. All other analytes were detected in omnivore samples at frequencies ranging from 3.0 to 12 percent. Of the four terrestrial omnivores studied in 1989, beetles showed the greatest propensity to accumulate contaminants. Among the omnivore control samples, dieldrin and mercury were the only target analytes detected, at frequencies of 14 and 8.3 percent, respectively.

The terrestrial carnivore trophic level was represented only by the burrowing owl. For this species in RMA-contaminated areas only dieldrin at a frequency of 100 percent, and DDE at a frequency of 50 percent were present. The USFWS geometric means at this trophic level were 0.12 and $0.0087 \mu\text{g/g}$ for dieldrin and DDE, respectively. No control samples for this trophic level were collected.

The detritivore trophic level was represented only by earthworms. For this species in RMA-contaminated areas, all seven target analytes were present. Frequencies of detection and, when calculated, USFWS geometric means for these target analytes were 4 percent for aldrin; 79 percent and 0.18 $\mu\text{g/g}$ for dieldrin; 5.0 percent for endrin; 21 percent for DDT; 25 percent for DDE; 100 percent and 1.4 $\mu\text{g/g}$ for arsenic; and 71 percent and 0.045 $\mu\text{g/g}$ for mercury, respectively. Control samples of this trophic level had detected concentrations of DDT (20 percent frequency), arsenic (80 percent frequency, 0.63 $\mu\text{g/g}$ USFWS geometric mean) and mercury (20 percent frequency).

4.1.3 Distribution of Target Analytes among Terrestrial BSAs

This final section presenting terrestrial data addresses the distribution of target analytes among the terrestrial BSAs. Figures 4.1-1 through 4.1-8 present bar graphs of analyte concentrations versus study site for each of the species sampled. Figures 4.1-14 through 4.1-22 present analyte concentration data versus species for each of the BSAs.

4.1.3.1 Sedentary Species. - Six of the seven target analytes were evidenced in BSA 1. Only DDE was not detected in this BSA. All of the sampled staked sites in BSA 1 (Figures 3.2-3 and 4.1-14) evidenced the presence of dieldrin and arsenic. Dieldrin and arsenic were the only target analytes ubiquitously present in BSA 1. Dieldrin's maximum concentrations at staked sites in order from greatest to least were BS1-3, BS1-1, BS1-2A, BS1-4, and BS1-5. Arsenic's maximum concentrations in order from greatest to least were BS1-1, BS1-2A, BS1-4, BS1-5, and BS1-3. Endrin was found at three sites (BS1-1, BS1-3, and BS1-5). Aldrin, DDT and mercury were each found at two sites. Aldrin was found at sites BS1-3 and BS1-4, while both mercury and DDT were found at sites BS1-2A and BS1-5. Site BS1-5, with five of the six target analytes detected, revealed the highest number of detected analytes. At this site, all five of these analytes were detected in a single species, deer mouse.

All seven of the target analytes were evidenced in BSA 2. Dieldrin was present at all seven of the sampled sites in BSA 2 (Figures 3.2-4 and 4.1-15). The highest concentrations of dieldrin in decreasing order were in Staked Sites BS2-7, BS2-4, BS2-2A, BS2-3, BS2-1, BS2-5, and BS2-3A. Mourning doves had the maximum concentrations detected for three of the staked sites and the maximum detected in the study area, at BS2-7. The remaining maximum concentrations were in samples of three sedentary species (beetle, earthworm, and deer mouse) and one mobile species (meadowlark). Five of the seven (71 percent) staked sites in BSA 2 also contained arsenic (BS2-1,

BS2-2A, BS2-3, BS2-4, and BS2-7). Endrin was also present at five staked sites (BS2-1, BS2-2A, BS2-4, BS2-5, and BS2-7). Arsenic and endrin detections were widely dispersed throughout the BSA. Mercury was present at three staked sites (BS2-1, BS2-2A, and BS2-4), also dispersed within the BSA. Three of four detections occurred in earthworm samples, while the fourth was in a deer mouse sample. Aldrin was found at BS2-2A and BS2-4, in beetle and dove, and another beetle sample, respectively. DDT was found at BS2-3A and BS2-4 in grasshopper and kochia samples, respectively. DDE was present at only one staked site (BS2-4), in an earthworm sample. Overall in BSA 2, staked site BS2-4 evidenced the greatest variety of target analytes within BSA 2, revealing all seven. At this site, five of the analytes were detected in an earthworm sample, aldrin was detected in a ground beetle sample, and DDT was found in a kochia sample.

All seven of the target analytes were detected in BSA 3. Also in BSA 3, dieldrin was detected in all five sampled staked sites (Figures 3.2-5 and 4.1-16). All species sampled within this BSA contained dieldrin. The greatest concentrations of dieldrin were in deer mice at Staked Sites BS3-1, BS3-2, and BS3-3A. Arsenic was present at 80 percent of the staked sites, in earthworm samples and in a prairie dog sample; it was absent only at Staked Site BS3-1, where earthworms and prairie dogs were not sampled. Mercury was present at three sites (BS3-2, BS3-4, and BS3-5) in earthworm samples and a prairie dog sample. Aldrin was present at Staked Sites BS3-1 and BS3-3A in deer mouse samples. Endrin was present at Staked Sites BS3-1 and BS3-4 in mourning dove samples. DDT was present in a prairie dog sample and DDE was present in a burrowing owl sample, both at Staked Site BS3-4. Staked Site BS3-4 evidenced detections for six of the seven target analytes in four species; the other three species evidenced only detected dieldrin.

All seven of the target analytes were detected in samples collected from within BSA 4. All five of the sampled staked sites (Figures 3.2-6 and 4.1-17) revealed dieldrin. Maximum concentrations within a staked site were for deer mouse samples, whenever they were sampled. The maximum value for dieldrin for the 1989 Biota CMP was 35 $\mu\text{g/g}$ for a deer mouse sample from Staked Site BS4-1. Arsenic was present in earthworms at the three staked sites in this BSA where earthworms were sampled (BS4-2, BS4-3, and BS4-4); in BS4-2, it was also present in all three plant species sampled. DDE was found in two staked sites (BS4-1 and BS4-4); each of the three detections was in a different species. Aldrin was detected twice, once in a deer mouse sample in BS4-3 and once in an earthworm sample in BS4-4. Endrin was also detected twice, once in a mourning dove in BS4-1 and once in a grasshopper sample in BS4-3. DDT was only detected once, in BS4-1 in a

grasshopper sample. Overall in BSA 4, Staked Site BS4-3 evidenced the highest number of detected analytes, five.

Six target analytes were detected in BSA 5; only aldrin was not detected. In BSA 5 (Figures 3.2-7 and 4.1-18), as elsewhere, dieldrin was the most frequently detected target analyte among sampled staked sites. It was detected in every sampled staked site (BS5-1, BS5-2, BS5-3A, BS5-4, and BS5-6). The maximum concentration was in a ring-necked pheasant sample collected from Staked Site BS5-2. An earthworm sample from BS5-6 and a ground beetle sample from BS5-4 also contained elevated dieldrin concentrations. Arsenic was also detected at all staked sites, but always at a lesser frequency than dieldrin. The maximum arsenic detection for this BSA occurred in an earthworm sample from BS5-6. In fact, all arsenic detections were in earthworm samples, except for one ground beetle sample from BS5-4. Mercury was also detected in BSA 5 in earthworms at Staked Sites BS5-2, BS5-4, and BS5-6. DDE was detected in three of the staked sites, while endrin and DDT were detected in two of the staked sites. In one case, a single cheatgrass sample at BS5-4, all three of these analytes were detected. Staked Site BS5-4 evidenced the highest number of contaminant analytes, six.

Three of the target analytes were evidenced in samples collected from BSA 11 (Figures 3.2-8 and 4.1-19). Dieldrin and arsenic were both found in an earthworm sample from BS11-1 and an earthworm sample from BS11-3. One grasshopper sample collected from BS11-2 contained detectable DDT. Deer mouse samples from all three staked sites had no analyte detections.

All seven target analytes were detected in samples collected from BSA 12 (Figures 3.2-9 and 4.1-20). Dieldrin was detected at both staked sites (BS12-1 and BS12-2) and in mobile prairie dog samples and a mourning dove sample. Five of the target analytes were found in BS12-1 and BS12-2.

Five of the seven target analytes were detected in earthworm samples collected in BSA 13 (Figures 3.2-10 and 4.1-21). Aldrin and endrin were not found in this BSA. The only dieldrin detection occurred at site BS13-1. This earthworm sample also had detections for arsenic, mercury, DDE, and DDT. All four sites and samples evidenced arsenic. Three of the four evidenced mercury and DDE, while two evidenced DDT. In BSA13 also, soil and water samples were collected and analyzed for the seven target analytes. One surface soil sample was collected in association with earthworm collection at each of the five BSA 13 site locations. Water samples were taken from the

sprinkler head nearest (usually within 10 ft) each soil sample location. No target analytes were detected in the water samples. However, all five soil samples had detections of dieldrin (range = 0.0400 to 3.90 $\mu\text{g/g}$), DDE (range = 0.130 to 2.70 $\mu\text{g/g}$), and DDT (range = 0.0400 to 0.370 $\mu\text{g/g}$). Four of five soils samples had detections of aldrin (range = 0.00291 to 0.00820 $\mu\text{g/g}$). The soil sample (BS13-5) with the greatest detected dieldrin concentration also had a detection of endrin (0.0400 $\mu\text{g/g}$). The soil sample collected at BS13-2 had the only mercury detection (0.364 $\mu\text{g/g}$) as well as the greatest detected concentrations of aldrin, DDE, and DDT. Arsenic was not detected in any of the soil samples.

In the control areas (Figures 2.2-1 and 4.1-1 through 4.1-13), dieldrin was detected twice, in Staked Control Site BCRM-3A near the eastern boundary of RMA in the northeastern control area and in BCRM-5A near the southeast corner of RMA in the southeastern control area; both detections were in beetle samples. Arsenic was the most widespread of the target analytes in the staked control sites, and was present in sampled earthworms from BCRM-2, BCRM-4, BCRM-5A, BCRM-6. Arsenic was also present in two prairie dog samples from the BCTL. DDT was present in one earthworm sample collected at BCRM-6. Mercury was present in an earthworm sample and in a deer mouse sample, both collected from BCRM-5A.

Overall for sedentary species within the study and control areas on RMA, the patterns of distribution of the target analytes vary considerably. DDT was present in 13 of 134 samples of sedentary species collected on RMA and in one of 31 control species samples. DDT was detected at least once for sedentary species in every BSA except BSA 3. Aldrin was detected in sedentary species in BSA 1, BSA 2, BSA 3, BSA 4, and BSA 12. Aldrin was present in nine of 134 samples of sedentary species and in none of the 31 control samples. DDE was also present in nine of 34 sedentary species samples on RMA and in none of the 31 control samples. DDE was detected at least once for sedentary species in every BSA except BSA 1, BSA 3, BSA 11, and BSA 12. Mercury occurred in 20 of 157 samples of sedentary species and in two of 37 control samples. Mercury occurred at least once for sedentary species in all BSAs except BSA 11. Arsenic was virtually ubiquitous. It was detected in four of five staked control sites sampled for earthworms and four of the six staked control sites sampled (4 of 47 samples). It was also detected in all BSAs (42 of 157 samples). Endrin was not detected in sedentary species in BSA 3, BSA 11 or BSA 13. Dieldrin, was widespread within all BSAs except BSA 13 where it was detected in only one sample. Both dieldrin and endrin were totally absent in the control areas, except for the two hits of dieldrin previously discussed in beetles.

Among BSAs with more than 100 analyte analyses performed, BSA 4 revealed the most detections (26 hits of 120 possible hits, 22 percent) in sedentary species samples. Overall, RMA had 175 hits of 976 possible hits (18 percent) for sedentary species.

4.1.3.2 Mobile Species. - In Figures 4.1-1 through 4.1-13, the analyte concentrations are also presented for terrestrial mobile species from the five BSAs, the near peripheral area, and collective off-post control areas. The most consistent pattern to emerge from these bar graphs is that dieldrin was detected in all BSAs except BSA 11 and BSA 13, where no mobile species were collected. It was also detected in the near peripheral area. Dieldrin was not detected in the 21 mobile species control samples. On RMA, dieldrin was detected in 76 of 101 mobile samples. It was present in samples of every mobile species analyzed from RMA and was the only analyte detected in every mobile species.

Aldrin was detected in one mourning dove in BSA 2, Staked Site BS2-2A; it was not detected in the remaining 101 mobile RMA samples. Aldrin was not detected in any of the 21 mobile species control samples. Endrin was detected in 11 of 102 samples of mobile species on RMA and in none of the 21 control samples. All 11 samples containing detectable concentrations of endrin were from one species, mourning dove.

DDT was detected in one black-tailed prairie dog sample from BSA 3 at Staked Site BS3-4; it was not detected in the remaining 101 samples. DDT was not detected in any of the 21 mobile species control samples.

DDE was detected in six of 102 RMA samples of mobile species. It was not detected in western meadowlarks or black-tailed prairie dogs, but was detected in the other three mobile species. DDE was detected in BSAs 3, 4 and 5. It was not detected in the 21 control samples of mobile species.

Arsenic was detected in six of the 102 samples of mobile species. Five of the six detections occurred in prairie dogs collected from BSAs 1, 2, and 3. The other detection occurred in a mourning dove sample collected from BSA 2, Staked Site BS2-7. One mobile species, the black-tailed prairie dog, evidenced two detections of arsenic from the Trilby Lateral (BCTL) control site. Arsenic was not detected in the remaining 21 samples of mobile control species. Mercury was present in one prairie dog sample collected from BSA 3 on RMA and in none of the 21 control samples.

Among BSAs with more than 100 analyte analyses performed, BSA 2 revealed the most detections (17 hits of 193 possible hits, 8.8 percent) in mobile species samples. Overall, RMA had 102 hits of a possible 706 hits (14 percent) for mobile species.

For mobile species and sedentary species combined, RMA evidenced the most target analyte detections at BSA 1 (53 hits of 293 possible hits, 18 percent). Overall on RMA, 277 biota samples had detectable analyte concentrations of a possible 1,682 samples analyzed (16 percent). Control areas had 11 detectable analyte concentrations of a possible 374 (2.9 percent).

4.2 Chemical Results for Aquatic Species

This section presents chemical results for intentional aquatic species in detail by target analyte. As for terrestrial species, a table for each analyte (Tables 4.2-1 through 4.2-7) provides the total number of samples, the total number of hits, and descriptive statistics. The species summaries that follow are supported by bar graphs showing for each species all analytes detected and the location of the detection (Figures 4.2-1 through 4.2-13). A detection summary (Table 4.2-8) and descriptive statistics (Tables 4.2-9 through 4.2-15) are provided for the combinations of aquatic species in trophic levels. Finally, geographic summaries by BSA are supported by bar graphs (Figures 4.2-14 through 4.2-17). Thus, in the sections that follow, the analytical data for aquatic water birds, fish, macrophytes, and plankton will be presented first by analyte, then by species and, finally, by sampling location. Note that OCP data for aquatic sedentary samples (macrophytes) were not available for inclusion in this report. Also, because the Rod and Gun Club Pond (BSA 9) water was so low, no samples were collected from it in 1989. Refer to the Glossary following the List of Figures for a legend of acronyms used in the figures and tables.

4.2.1 Target Analytes in Aquatic Species

4.2.1.1 Aldrin. - Aldrin was detected in one aquatic species sampled in 1989 under the CMP Biota Monitoring Program (Table 4.2-1). It was detected in one of 56 (1.8 percent) mobile species samples, more specifically in one of three mallard samples collected at BSA 10 at a concentration of 0.093 $\mu\text{g/g}$. Aldrin was not detected in any of the 36 off-post control samples that were analyzed for OCPs.

4.2.1.2 Dieldrin. - As it was for most terrestrial species investigated on RMA in 1989, dieldrin was the most frequently detected analyte in aquatic species sampled on RMA (Tables 4.2-2 and 4.2-8). It was detected in every RMA-BSA and in every species in which it was analyzed. The analyte was detected in 48 of the 56 (86 percent) samples from BSAs that were analyzed for OCP, and in none of the 36 control samples. Overall, the highest concentration of dieldrin detected in aquatic samples (3.8 $\mu\text{g/g}$) was from the dressed carcass of a mallard collected in BSA 10. The lowest detected concentration (0.019 $\mu\text{g/g}$) was in a bluegill from BSA6.

In BSA 6, Lake Mary, dieldrin was detected (14 of 21 samples) in all four fish species sampled: catfish, largemouth bass, bluegill and bullhead. It was also detected in the American coot and the killdeer. Dieldrin was detected in both of the two catfish samples, at concentrations ranging from 0.050 to 0.091 $\mu\text{g/g}$ (USFWS geometric mean = 0.068 $\mu\text{g/g}$). It was detected in four of the five largemouth bass collected in Lake Mary, at concentrations ranging from 0.022 to 0.054 $\mu\text{g/g}$ (USFWS geometric mean = 0.018 $\mu\text{g/g}$). This analyte was detected in two of the five bluegill at concentrations of 0.019 and 0.026 $\mu\text{g/g}$ and in the only bullhead collected at 0.016 $\mu\text{g/g}$. Both of the American coots collected in BSA 6 contained dieldrin, at concentrations of 0.020 and 0.10 $\mu\text{g/g}$ (USFWS geometric mean = 0.045 $\mu\text{g/g}$). All three of the killdeer sampled contained dieldrin at concentrations ranging from 0.90 to 1.4 $\mu\text{g/g}$ (USFWS geometric mean = 1.1 $\mu\text{g/g}$).

In BSA 7, Ladora Lake, dieldrin was detected (14 of 14 samples) in bluegill, largemouth bass and American coots. Dieldrin was detected in all five of the bluegill samples, with concentrations ranging from 0.049 $\mu\text{g/g}$ to 0.98 $\mu\text{g/g}$ (USFWS geometric mean = 0.15 $\mu\text{g/g}$). In largemouth bass, dieldrin was detected in all of the five samples, at concentrations between 0.062 and 0.53 $\mu\text{g/g}$ (USFWS geometric mean = 0.16 $\mu\text{g/g}$). All four of the American coots collected in BSA 7 contained dieldrin, as well, with concentrations ranging from 0.11 to 0.18 $\mu\text{g/g}$ (USFWS geometric mean = 0.13 $\mu\text{g/g}$).

In BSA 8, Lower Derby Lake, dieldrin was detected (13 of 17 samples) in bluegill, largemouth bass, bullhead, and killdeer. Four of the five bluegill samples contained dieldrin, with concentrations ranging from 0.035 to 0.99 $\mu\text{g/g}$ (USFWS geometric mean = 0.046 $\mu\text{g/g}$). Dieldrin was detected in five of the five largemouth bass samples, at concentrations of 0.022 to 0.13 $\mu\text{g/g}$ (USFWS geometric mean = 0.059 $\mu\text{g/g}$). Of five bullhead collected in Lower Derby Lake, two contained dieldrin, at concentrations of 0.035 and 0.040 $\mu\text{g/g}$. Both of the killdeer sampled contained dieldrin at concentrations of 0.15 and 1.1 $\mu\text{g/g}$ (USFWS geometric mean = 0.42 $\mu\text{g/g}$).

In BSA 10, Upper Derby Lake, only mallards and blue-winged teal were collected; dieldrin was detected in all seven samples. Dieldrin was detected in all three mallard samples analyzed, at

concentrations between 0.070 and 3.8 $\mu\text{g/g}$ (USFWS geometric mean = 0.37 $\mu\text{g/g}$). In four of the four blue-winged teal samples analyzed for dieldrin, the USFWS geometric mean concentration was 0.35 $\mu\text{g/g}$ and the detected range was 0.20 to 0.57 $\mu\text{g/g}$.

Dieldrin was not detected in any of the off-post control samples, including the three northern pike that were sampled to supplement the small 1988 control group.

4.2.1.3 Endrin. - As it was for most terrestrial species investigated on RMA in 1988, endrin in 1989 was infrequently detected in aquatic species throughout the RMA lakes investigated (Table 4.2-3). Endrin was detected at low frequency in three of the four aquatic BSAs. It was not detected in BSA 8. Endrin was detected in only mobile species, in one fish species and in two of the four bird species sampled. The analyte was detected in five of the 56 (8.9 percent) mobile samples from BSAs and in none of the 36 control samples. Overall, the highest concentration of endrin detected in aquatic samples (0.20 $\mu\text{g/g}$) was from a killdeer collected from BSA 6.

In BSA 6, endrin was detected in three of three killdeer (range = 0.071 to 0.20 $\mu\text{g/g}$, USFWS geometric mean = 0.11 $\mu\text{g/g}$). This analyte was not detected in any of the fish samples.

In BSA 7, endrin was detected in one of five largemouth bass samples at a concentration of 0.048 $\mu\text{g/g}$.

In BSA 10, endrin was detected in one of three mallards at a concentration of 0.10 $\mu\text{g/g}$.

4.2.1.4 DDT. - As with endrin, DDT was infrequently detected in RMA aquatic biota (Table 4.2-4). The analyte was detected in two of the 56 (3.6 percent) mobile samples from BSAs and in none of the 36 control samples. Two of three killdeer samples collected from BSA 6 had detections (range = 0.96 to 1.2 $\mu\text{g/g}$, USFWS geometric mean = 0.11 $\mu\text{g/g}$). DDT was not detected in 1989 fish samples.

4.2.1.5 DDE. - DDE was detected more frequently than DDT throughout RMA aquatic biota (Table 4.2-5). The analyte was detected in 23 of the 56 (41 percent) samples from BSAs that were analyzed for OCPs, and in six of the 36 (17 percent) control samples. Overall, the highest concentration of DDE detected in aquatic samples (29 $\mu\text{g/g}$) was from a killdeer collected from BSA 6.

In BSA 6, DDE was detected in two of the two catfish samples, with concentrations ranging from 0.14 to 0.21 $\mu\text{g/g}$ (USFWS geometric mean = 0.17 $\mu\text{g/g}$). DDE was detected in four of the five largemouth bass samples, at concentrations ranging from 0.096 to 0.17 $\mu\text{g/g}$ (USFWS geometric mean = 0.05 $\mu\text{g/g}$). This analyte was also detected in the only bullhead sampled at a concentration of 0.43 $\mu\text{g/g}$. One of the two American coot samples had a DDE detection at a concentration of 0.23 $\mu\text{g/g}$. All three killdeer collected had DDE detections at concentrations ranging from 2.6 to 29 $\mu\text{g/g}$ (USFWS geometric mean = 7.0 $\mu\text{g/g}$).

In BSA 7, three of five largemouth bass samples contained DDE, at concentrations ranging from 0.11 to 0.16 $\mu\text{g/g}$ (USFWS geometric mean = 0.020 $\mu\text{g/g}$).

In BSA 8, only largemouth bass and killdeer contained detectable concentrations of DDE. Four of five largemouth bass collected in Lower Derby Lake contained detectable concentrations of DDE, ranging from 0.080 to 0.10 $\mu\text{g/g}$ (USFWS geometric mean = 0.036 $\mu\text{g/g}$). Both killdeer sampled in the lake contained DDE, at concentrations ranging from 0.28 to 3.7 $\mu\text{g/g}$ (USFWS geometric mean = 1.0 $\mu\text{g/g}$).

In BSA 10, DDE was detected in the dressed carcass of one of the three mallards collected there at a concentration of 0.10 $\mu\text{g/g}$. DDE was also detected in the dressed carcass samples of two of the four blue-winged teal collected at concentrations ranging from 0.11 to 0.13 $\mu\text{g/g}$ (USFWS geometric mean = 0.011 $\mu\text{g/g}$). No other species were collected in BSA 10.

DDE was detected in six of seven of the mallard off-post control samples from Wellington Wildlife Refuge at concentrations ranging from 0.067 to 0.15 $\mu\text{g/g}$ (USFWS geometric mean = 0.046 $\mu\text{g/g}$).

4.2.1.6 Arsenic. - Arsenic was not detected in the tissues of any fish or aquatic water birds sampled in 1989 on RMA (Table 4.2-6); it was detected only in sedentary species and plankton. One off-post control catfish sample had a detectable concentration of arsenic (2.4 $\mu\text{g/g}$). Otherwise, detections of this metal occurred either in plankton samples or aquatic macrophytes, and occurred in all lakes sampled for these species. The analyte was detected in 19 of the 98 (19 percent) samples from BSAs, and in 11 of the 51 (22 percent) control samples. Overall, the highest concentration of arsenic detected (2.9 $\mu\text{g/g}$) was from a sego pondweed sample taken from BSA 8. The highest concentration in an off-post control plant sample (1.6 $\mu\text{g/g}$) was in American pondweed.

In BSA 6, arsenic was detected in one of the three coontail samples, at a concentration of 0.44 $\mu\text{g/g}$. This metal was also detected in three of the three sego pondweed samples (range = 0.52 to

0.81 $\mu\text{g/g}$, USFWS geometric mean = 0.61 $\mu\text{g/g}$), and in one of four American pondweed samples (0.45 $\mu\text{g/g}$). Plankton contained the most arsenic detections, five out of five samples, with a concentration ranging from 0.46 to 0.64 $\mu\text{g/g}$ (USFWS geometric mean = 0.55 $\mu\text{g/g}$).

In BSA 7, arsenic was detected only in one of the five plankton samples at a concentration of 0.40 $\mu\text{g/g}$. There were no other arsenic detections in Ladora Lake.

In BSA 8, arsenic was detected in three of the three sego pondweed samples collected. These concentrations ranged from 0.46 to 2.9 $\mu\text{g/g}$ (USFWS geometric mean = 1.1 $\mu\text{g/g}$). Four of the four American pondweed samples contained arsenic, at concentrations ranging from 0.40 to 0.69 $\mu\text{g/g}$ (USFWS geometric mean = 0.53 $\mu\text{g/g}$). One of the five plankton samples contained arsenic at a concentration of 0.43 $\mu\text{g/g}$.

Arsenic was also detected in several species collected from one of the control lakes, McKay Reservoir. The metal was detected in five of the five samples of American pondweed, at concentrations ranging from 0.41 to 1.6 $\mu\text{g/g}$ (USFWS geometric mean = 0.72 $\mu\text{g/g}$). Five of the five samples of plankton collected in McKay Reservoir contained arsenic, at concentrations between 0.57 and 0.88 $\mu\text{g/g}$ (USFWS geometric mean = 0.65 $\mu\text{g/g}$). In addition was the detection in the one catfish sample (2.4 $\mu\text{g/g}$). These values exceed those found in similar samples from on-post lakes.

4.2.1.7 Mercury. - In contrast to arsenic, mercury was very rarely detected in either plankton or aquatic macrophytes (Table 4.2-7). All detections of this metal in the aquatic BSAs occurred in samples from mobile species, either fish or water birds, with the single exception of one detection in an American pondweed sample. Mercury occurred in samples from all RMA lakes sampled in 1989; it also occurred in samples from the aquatic control areas. The analyte was detected in 52 of the 98 (53 percent) samples from BSAs, and in 25 of the 51 (49 percent) control samples. Overall, the highest concentration of mercury detected in aquatic samples from RMA (0.57 $\mu\text{g/g}$) was from a largemouth bass sample taken from BSA 7, Ladora Lake. The highest concentration in a control sample (0.98 $\mu\text{g/g}$) was 172 percent of the RMA value, and was also from a largemouth bass sample.

In BSA 6, mercury was detected in all five bluegill collected, at a concentration range of 0.057 to 0.14 $\mu\text{g/g}$ (USFWS geometric mean = 0.084 $\mu\text{g/g}$). The metal was also detected in all five largemouth bass collected, at concentrations ranging from 0.22 to 0.30 $\mu\text{g/g}$ (USFWS geometric mean = 0.26 $\mu\text{g/g}$). One of the two catfish contained mercury at a concentration of 0.064 $\mu\text{g/g}$, and the only bullhead collected contained this analyte at a concentration of 0.26 $\mu\text{g/g}$. The metal was detected in both of the two American coots collected in this BSA at concentrations of 0.057 and

0.083 $\mu\text{g/g}$ (USFWS geometric mean = 0.069 $\mu\text{g/g}$). Mercury was also detected in all three killdeer samples (range = 0.083 to 0.11 $\mu\text{g/g}$, USFWS geometric mean = 0.097 $\mu\text{g/g}$).

In BSA 7, four of the five bluegill contained mercury, at concentrations of ranging from 0.061 to 0.20 $\mu\text{g/g}$ (USFWS geometric mean = 0.062 $\mu\text{g/g}$). Mercury was detected in all five largemouth bass collected, at concentrations ranging from 0.062 to 0.57 $\mu\text{g/g}$ (USFWS geometric mean = 0.18 $\mu\text{g/g}$). The metal was also detected in three of the four American coots collected from the lake (range = 0.054 to 0.060 $\mu\text{g/g}$, USFWS geometric mean = 0.038 $\mu\text{g/g}$).

In BSA 8, mercury was detected in all three fish species collected. Five of the five bluegill samples contained mercury, at concentrations varying from 0.071 to 0.21 $\mu\text{g/g}$ (USFWS geometric mean = 0.13 $\mu\text{g/g}$). All five largemouth bass samples collected contained mercury, at concentrations ranging from 0.11 to 0.24 $\mu\text{g/g}$ (USFWS geometric mean = 0.16 $\mu\text{g/g}$). Five of five bullhead collected in Lower Derby Lake contained mercury, at a concentration range of 0.055 to 0.086 $\mu\text{g/g}$ (USFWS geometric mean = 0.069 $\mu\text{g/g}$). This analyte was also detected in one of two killdeer sampled at a concentration of 0.11 $\mu\text{g/g}$. The detection of mercury in American pondweed (0.051 $\mu\text{g/g}$) was the only detection in an aquatic macrophyte or plankton.

In BSA 10, the only aquatic species collected were the mallard and the blue-winged teal. Two of three mallard dressed carcass samples contained mercury, at a concentration range of 0.088 to 0.24 $\mu\text{g/g}$ (USFWS geometric mean = 0.064 $\mu\text{g/g}$). All four blue-winged teal dressed carcass samples contained mercury (range = 0.082 to 0.34 $\mu\text{g/g}$, USFWS geometric mean = 0.17 $\mu\text{g/g}$).

In contrast to other target analytes, mercury was detected in all fish and water bird species collected in control areas, except the bullheads collected at Walden Ponds. Other aquatic control samples were collected at College Lake (northern pike), McKay Reservoir (other fish), and Wellington Wildlife Refuge (water birds). Mercury in control samples was present at nearly equal or slightly higher frequencies compared to RMA BSAs. All five bluegill control samples contained mercury concentrations with a USFWS geometric mean of 0.093 $\mu\text{g/g}$, as compared to the RMA mean of 0.088 $\mu\text{g/g}$ for this species. All five largemouth bass control samples contained mercury, at a USFWS geometric mean concentration of 0.14 $\mu\text{g/g}$, less than the RMA mean of 0.19 $\mu\text{g/g}$ for this species. Two of the five catfish control samples contained mercury at a range of concentrations (0.064 to 0.14 $\mu\text{g/g}$) that included the RMA value (0.064 $\mu\text{g/g}$) for this species. All three of the control northern pike also contained mercury (USFWS geometric mean = 0.12 $\mu\text{g/g}$). Six of seven control mallards contained a USFWS geometric mean mercury concentration of 0.049 $\mu\text{g/g}$, less than the RMA USFWS geometric mean of 0.064 $\mu\text{g/g}$. Finally, four of the five control American coot samples contained mercury, at a USFWS geometric mean concentration of 0.056 $\mu\text{g/g}$, compared to 0.046 $\mu\text{g/g}$ for American coot samples collected on RMA.

4.2.2 Distribution of Target Analytes within Aquatic Species Sampled

The thirteen aquatic species sampled under the 1989 CMP Biota Monitoring Program evidenced varying patterns of analyte presence and concentration. These patterns are illustrated in Figures 4.2-1 through 4.2-13.

4.2.2.1 Aquatic Species. - Three species of aquatic macrophytes and also plankton, which is comprised of both phytoplankton (plant species) and zooplankton (animal species), were collected from RMA BSA lakes and from McKay Reservoir, Sawhill Ponds, or Walden Ponds, the control lakes, as species were available. All four of these taxa contained concentrations of arsenic and one American pondweed sample had a mercury detection. As already explained, aquatic macrophytes and plankton samples were not analyzed for OCPs for this report. However, sego pondweed contained the highest concentrations of arsenic and the highest frequency of detected concentrations. American pondweed provided detected mercury, in addition. Therefore, both pondweed species were the most effective plant indicators of the target analytes, based on the data currently available. Because plankton was widespread and arsenic was consistently detected in its samples, plankton was the next most effective indicator of arsenic. The frequency of detection and maximum concentration of arsenic were higher in the control samples than in the RMA samples for American pondweed and plankton, but not for sego pondweed or coontail.

Six species of fish were collected for the 1989 Biota CMP: brown bullhead, black bullhead, channel catfish, bluegill, largemouth bass, and northern pike, although the bullheads were treated together for data analysis. Northern pike was not an intentional species on RMA in 1989; three off-post control samples were collected to augment the 1988 control group. In samples of two of these species, four of the seven target analytes were found. Largemouth bass samples contained dieldrin, DDE, endrin, and mercury; channel catfish samples contained dieldrin, DDE, mercury, and in control areas, arsenic. In samples of two of these species, the bullhead, three (dieldrin, DDE, and mercury) of the seven target analytes were found. Bluegill contained dieldrin and mercury. The maximum concentration of dieldrin was highest in bluegill, the highest USFWS geometric mean and greatest frequency of detection was in channel catfish. The maximum concentration of DDE was highest in a bullhead sample, and the USFWS geometric mean concentration was highest in a catfish sample. USFWS geometric mean concentrations of mercury in samples from RMA lakes were highest in largemouth bass, a top predator. Largemouth bass and bluegill exhibited the widest geographic distribution among sampled areas and most frequent detections of mercury. Overall in

1989, especially largemouth bass and also bluegill were the most effective and consistent indicators of the target analytes; where they were present, channel catfish were next most effective. Fish were not good indicators of aldrin, endrin, DDT, or arsenic in 1989 sampling on RMA because there were so few detections of these analytes. The only target analytes found in the control samples of fish species were mercury at a slightly lower frequency than on-post and arsenic at about one and a half times the on-post frequency.

Of the four species of aquatic birds sampled, American coot, mallard, blue-winged teal, and killdeer, samples of two contained detectable concentrations of five of the target analytes: killdeer (dieldrin, DDT, DDE, endrin, and mercury), and mallard (dieldrin, DDE, endrin, arsenic, and mercury). Samples of the other two species contained detectable concentrations of dieldrin, DDE, and mercury. Thus, all four species contained reportable concentrations of dieldrin, DDE, and mercury in their tissues. Concentrations of DDE were highest in the killdeer; except for one high detected concentration in a mallard sample, dieldrin concentrations were also highest in the killdeer. Mercury concentrations were also highest in killdeer, as determined by the USFWS geometric mean concentrations for the four species. The greatest maximum concentrations of dieldrin, DDE, and mercury occurred in the mallard, killdeer, and blue-winged teal, respectively. Killdeer had the only detections for DDT and the highest frequency of detections for endrin. In 1989, killdeer were the best overall indicator of target analyte detection. Off-post control samples of both mallards and coots contained mercury, while samples of mallards also contained detectable concentrations of DDE.

Overall, sego pondweed, American pondweed, largemouth bass, bluegill, and killdeer were the most sensitive indicators of target analyte presence among the aquatic samples collected on RMA, based on concentration, number of analytes detected, percentage of detections, and geographic distribution of detections. When all target analytes are viewed collectively, killdeer samples had the greatest number of hits; 54 percent of the maximum number of hits possible (35) from all RMA BSA samples were present in this species. Of the total possible (105) hits, largemouth bass provided 39 percent, mallards provided 38 percent (of 21), channel catfish provided 36 percent (of 14), American coots provided 29 percent (of 42), bullhead provided 24 percent (of 42), bluegill provided 24 percent (of 105), and plankton provided 23 percent (of 30). The remaining species, all plants, would probably each have provided less than ten percent of the total possible hits if all analyses had been done. Because OCPs were not analyzed and plants tend to have high percentages of arsenic detection, the plant percentages for frequency of analyte detection were artificially inflated

(Table 4.2-8). Off-post sedentary species samples provided 50 percent of the possible control sample hits for arsenic, while mobile species provided 15 percent. Mobile off-post control samples also provided 64 percent of the possible hits for mercury and 18 percent of the possible hits for DDE.

When the analytes are considered independently for the aquatic species, killdeer provided the greatest percentage of possible hits in RMA BSAs for DDT (40 percent), DDE (100 percent), and endrin (60 percent). American coots had the highest percentage of possible hits for dieldrin (100 percent). Several other species also had 100 percent of the possible hits for dieldrin, but for smaller sample sizes. Mallards provided the greatest percentage of possible hits for aldrin (33 percent). Largemouth bass and bullhead both had a 100 percent frequency of mercury detections, but largemouth bass had a much larger sample size. Sego pondweed had the highest percentage of the possible hits for arsenic (67 percent).

Of the seven target analytes, maximum concentrations detected in RMA aquatic BSAs were: aldrin in mallards (0.093 $\mu\text{g/g}$ in BSA 10), dieldrin in mallards (3.8 $\mu\text{g/g}$ in BSA 10), DDT in killdeer (1.2 $\mu\text{g/g}$ in BSA 6), DDE in killdeer (29 $\mu\text{g/g}$ in BSA 6), endrin in killdeer (0.20 $\mu\text{g/g}$ in BSA 6), arsenic in sego pondweed (2.9 $\mu\text{g/g}$ in BSA 8), and mercury in largemouth bass (0.98 $\mu\text{g/g}$ in McKay Reservoir). The maximum concentration of mercury detected on-post was 0.57 $\mu\text{g/g}$ in largemouth bass.

4.2.2.2 Aquatic Trophic Groups. - Six aquatic trophic groups, comprised of both sedentary and mobile species, were developed for data analyses. The groupings and species within each aquatic trophic group are:

- APPR - Primary Producers: coontail, sego pondweed, American pondweed
- APCO - Primary Consumers: plankton
- AWCO - Aquatic Water Column Omnivores: American coots, mallards, blue-winged teal
- ABFO - Aquatic Bottom Feeding Omnivores: black and brown bullhead
- APCA - Primary Carnivores: bluegill, killdeer
- ATCA - Top Carnivores: largemouth bass

Table 4.2-8 provides detection frequencies for individual species belonging to a particular aquatic trophic group. Analytical hits are summed by species as well as by analyte for a particular group. Tables 4.2-9 through 4.2-15 present the descriptive statistics for each of the six aquatic trophic groups.

Forty-four percent of the 27 primary producer samples from RMA BSAs contained arsenic, while in the control areas 50 percent of the 10 samples contained arsenic. The USFWS geometric mean was 0.30 $\mu\text{g/g}$ in the control areas. This chemical was found in all three species comprising this group. Mercury was found in one of 27 samples (3.7 percent) of the group. OCPs were not analyzed for this group as explained at the beginning of Section 4.2.

Plankton has been designated as a primary consumer taxon, but in reality is a composite of primary producers (phytoplankton) and primary consumers (zooplankton). Nonetheless, the high frequency of arsenic in plankton [47 percent in the 15 RMA samples and 100 percent (USFWS geometric mean = 0.65 $\mu\text{g/g}$) in the five control samples] is more similar to the pattern of occurrence of this chemical in the primary producer group.

One hundred percent of all 13 aquatic water column omnivores sampled on RMA contained dieldrin (USFWS geometric mean = 0.19 $\mu\text{g/g}$). The 13 aquatic column omnivore samples contained mercury (USFWS geometric mean = 0.074 $\mu\text{g/g}$) at a frequency of 85 percent in RMA BSAs. DDE was also detected in 31 percent of these samples. In the control samples of AWCOs, DDE and mercury were also present, at frequencies of 50 and 83 percent, respectively with corresponding USFWS geometric means of 0.0093 and 0.052 $\mu\text{g/g}$. Single detections were recorded for aldrin and endrin in BSA samples.

Sixty-three percent of the aquatic bottom feeding omnivore samples from RMA BSAs contained dieldrin, with a USFWS geometric mean concentration of 0.014 $\mu\text{g/g}$. Two other analytes, DDE and mercury, were detected in this trophic group: DDE (frequency, 38 percent), and mercury (frequency, 88 percent; USFWS geometric mean, 0.065 $\mu\text{g/g}$). Both arsenic and mercury were also present in control area samples of these species, at frequencies of 9.1 percent and 18 percent, respectively.

Eighty percent of the primary carnivore samples from RMA BSAs contained dieldrin. This trophic level also contained endrin, DDT, DDE, and mercury (15, 10, 25, and 90 percent frequency, respectively). The USFWS geometric means for dieldrin and mercury were 0.066 and 0.082 $\mu\text{g/g}$

in samples from RMA BSAs. Only mercury was detected in primary carnivore control samples, at a frequency of 100 percent and with a USFWS geometric mean of 0.093 $\mu\text{g/g}$.

Ninety-three percent of the top carnivore samples from RMA BSAs contained dieldrin, at a USFWS geometric mean concentration of 0.056 $\mu\text{g/g}$. The three other target analytes present were endrin (frequency, 6.7 percent), DDE (73 percent; USFWS geometric mean, 0.033 $\mu\text{g/g}$), and mercury (frequency, 100 percent; USFWS geometric mean, 0.19 $\mu\text{g/g}$). In the control areas, mercury was the only one of these analytes present, with a frequency of 100 percent, and a USFWS geometric mean concentration of 0.13 $\mu\text{g/g}$.

4.2.3 Distribution of Target Analytes among Aquatic BSAs

As for terrestrial BSAs, this final section presenting aquatic data addresses the distribution of target analytes among the aquatic BSAs. Figures 4.2-1 through 4.2-13 present the distribution of detected analytes for each of the BSA aquatic sampling foci for samples of each species. Plants, plankton, all six fish species, and all four water bird species are addressed by BSA in Figures 4.2-14 through 4.2-17. The discussion that follows first presents information on sedentary species and analyte detections at sampling foci within BSAs followed by discussion of mobile species detected concentrations within BSAs, irrespective of location.

4.2.3.1 Sedentary Species. - In BSA 6, samples of American pondweed were collected at BS6-2, BS6-3, BS6-4, and BS6-5; the only target analyte detection was of arsenic in the sample collected at BS6-2. Sego pondweed was collected at three sampling foci, BS6-2, BS6-3, and BS6-4; arsenic was present in all three samples. Arsenic was present in the coontail collected at BS6-3 and absent from the samples collected at BS6-2 and BS6-5. Mercury was not detected in plants in this lake.

In BSA 7, three American pondweed samples were collected at BS7-3 and one sample was collected at BS7-1. Individual samples of sego pondweed were collected from BS7-1, BS7-4, and BS7-5. Samples of coontail were collected at BS7-3, BS7-4, and BS7-5. None of these samples had detections for arsenic or mercury.

In BSA 8, coontail was not sampled, American pondweed was sampled at all sampling foci except BS8-1, while sego pondweed was sampled at BS8-2, BS8-4, and BS8-5. Arsenic was detected in

all seven samples, and mercury was absent in six of them. Mercury was detected in American pondweed at BS8-5.

In BSA 10, no sedentary species were collected.

In McKay Reservoir, American pondweed was collected at all foci except BCML-5, and all five samples (two were from BCML-3) had arsenic detections. Four sego pondweed samples were collected at the Sawhill Ponds and one sample was collected at Walden Ponds near Boulder. None of these control samples had detections for arsenic or mercury.

Among the aquatic BSAs and Control Areas, arsenic was present in macrophytes collected from BSA 6, BSA 8, and McKay Reservoir. Arsenic was not detected in macrophyte samples from BSA 7 or the Sawhill Ponds or Walden Ponds. Within BSA 6, arsenic was detected more often at BS6-2 and BS6-3. Arsenic was detected at all sampled foci in BSA 8 and McKay Reservoir. On RMA, 67 percent of the sego pondweed samples contained arsenic, while 42 percent of the American pondweed samples and 17 percent of the coontail samples contained arsenic. The pattern of distribution of arsenic among the samples and locations did not appear to be correlated with inlets or greater water depths in RMA lakes or in McKay Reservoir.

4.2.3.2 Mobile Species. - Figures 4.2-14 through 4.2-17 also provide the distribution of target analytes for aquatic mobile species at each of the aquatic BSAs. Among the mobile species, plankton consistently evidenced the presence of arsenic in all areas where sampled, although in BSAs 7 and 8, only one of five samples of plankton contained detectable arsenic. All of the plankton samples collected in BSA 6 and McKay Reservoir contained detectable concentrations of arsenic. In BSAs 6, 7, and 8; six, three, and four mobile species were collected, respectively. Detected within these species collectively were five of the target analytes in BSA-6 (dieldrin, endrin, DDT, DDE, and mercury), four of the target analytes in BSA 7 (dieldrin, endrin, DDE, and mercury), and three of the target analytes in BSA 8 (dieldrin, DDE, and mercury). These three BSAs can be most readily compared, since they provide the most diverse ecosystems, and yielded the most variable and extensive samples. Only two mobile species, the mallard and the blue-winged teal, were collected at BSA 10, which is periodically flooded and in this instance had been flooded since spring 1988. Both species evidenced the presence of dieldrin, DDE, and mercury; one mallard sample evidenced the presence of aldrin and endrin as well.

Dieldrin was found in 14 of the 18 vertebrate samples collected from BSA 6. Three bluegill and one largemouth bass failed to evidence dieldrin in Lake Mary. Dieldrin was found in 14 of 14 of the samples from BSA 7 and in 13 of 17 of the samples from BSA 8. Three bullhead and a bluegill failed to evidence dieldrin in Lower Derby Lake. Thus, dieldrin was fairly widespread within BSAs and among the three BSAs being compared. If DDE was detected, dieldrin was also detected in every instance in these three BSAs. Similarly, if mercury was detected, dieldrin was also usually detected. Exceptions to this mercury - dieldrin association were three bluegill and a largemouth bass in BSA 6, none in BSA 7, and three bullhead and a bluegill in BSA 8. The association held for 37 samples. Endrin and DDT were detected in BSA 6, endrin was detected in BSA 7, and neither was detected in BSA 8.

Mercury was consistently detected among the samples of fish and water bird mobile species collected from McKay Reservoir and Wellington Wildlife Refuge. DDE was detected in six of 34 (18 percent) of the mobile species control samples. Arsenic was detected in six of 39 (15 percent) aquatic control samples. All six detections were for samples from McKay Reservoir, specifically for all five plankton samples and one catfish sample.

4.3 Chemical Results for 1988 Residual Samples

As noted in the Biota CMP 1988 Annual Report, a sample tracking, analytical, or QA/QC problem occasionally arose during the process of chemical analysis. These problems may have affected all analyses of a sample, or only one analyte. Such occurrences resulted in the need to reanalyze three intentional terrestrial samples and two intentional aquatic samples. Where sufficient homogenate was available, these reanalyses were performed and are reported here. While analytical difficulties were minor for the intentional sampling program in 1988, they were substantial for the fortuitous samples. As a result, all discussion of the fortuitous sample data was held for presentation in this Biota CMP 1989 Annual Report.

4.3.1 Chemical Results for 1988 Residual Samples of Intentional Species

Data from 13 samples of intentional species from 1988 were not available for the Biota CMP 1988 Annual Report: three kestrels, one thirteen-lined ground squirrel, seven cottontail samples, one mallard and one largemouth bass sample. All samples were of dressed carcass or whole body as appropriate to the species, except for cottontail samples. One cottontail sample was a dressed

carcass, four more samples represented paired liver-muscle combinations from the same specimen, and two were liver samples. The newly reported largemouth bass datum was only for mercury. The data from analysis of these intentional samples are presented in Table 4.3-1 and on Figure 4.3-1.

Dieldrin was detected in all 12 samples in which it was analyzed except in one cottontail muscle sample and one largemouth bass sample previously reported in 1988. The liver from the same cottontail did evidence dieldrin. Detected dieldrin concentrations ranged from 0.46 to 3.7 $\mu\text{g/g}$. Endrin was detected in muscle from one cottontail (0.29 $\mu\text{g/g}$). DDE was detected in all three kestrel samples and in the mallard sample (range = 0.11 to 0.40 $\mu\text{g/g}$). DDT was present in the liver but not the muscle sample from one cottontail specimen (0.35 $\mu\text{g/g}$). The largemouth bass sample and a cottontail muscle sample had detections for mercury. Aldrin was detected in one cottontail liver sample.

4.3.2 Chemical Results for 1988 Residual Samples of Fortuitous Species

Forty-two fortuitous samples of 14 species were analyzed under the 1988 Biota CMP. All types of fortuitous samples were not analyzed for all target analytes. OCP, arsenic, and mercury analyses were all requested for whole body and dressed carcass samples. However, when more than one tissue was analyzed from a single specimen, only OCP analyses were requested for all tissues. Arsenic analyses were done only on liver and brain tissue, and mercury analyses were requested only for liver and muscle tissue. All three analyses were requested for tissues analyzed in addition to or instead of these three typical ones. At times, some of these samples were exhausted before all three analyses could be done, or before reanalysis was required due to QA/QC evaluation results.

Table 4.3-2 provides the data for these fortuitous samples. Only samples for which data are reported, for the requested analyses, are included.

Of the 14 fortuitous species analyzed, one is an herbivore (mourning dove), five are omnivores (black-billed magpie, American robin, starling, western meadowlark, and Brewer's blackbird), and eight are carnivores (bull snake, ferruginous hawk, red-tailed hawk, Swainson's hawk, golden eagle, bald eagle, great horned owl, and badger). Note that while some of these species were fortuitous under the 1988 Biota CMP, they were added as intentional species under the 1989 Biota CMP. Thus, mourning dove and western meadowlarks were discussed in Section 4.1. Analyte detections

are provided in Figure 4.3-2 for the herbivore and omnivore samples and in Figure 4.3-3 for the carnivore samples.

Only one of the species analyzed contained no detected concentrations of any of the target analytes; all analyses performed were below the lower certified reporting limit (BCRL) for both the liver (e.g., no detected OCPs, arsenic, or mercury) and muscle (e.g., no detected OCPs or mercury) tissue of the Swainson's hawk collected in Section 33 on RMA. It will not be discussed further.

The one magpie, six robin, one starling, and four mourning dove samples were all collected in RMA Section 35 in the vicinity of the Administration Building and BSA 13, established in 1989. While these specimens resulted in 12 samples, the number of results received for each analyte varied from four to 12, because of the data rejection, sample exhaustion, and sample reanalysis interaction discussed above. In the samples from the Administration Building, dieldrin was detected in 100 percent (seven of seven). The range of detections was from 5.0 $\mu\text{g/g}$ in a magpie to 14 $\mu\text{g/g}$ in a mourning dove. Endrin was the next most frequent analyte detected (four of five samples, 80 percent), with a range of 0.19 to 0.39 $\mu\text{g/g}$. DDE (four of eight samples, 50 percent) and DDT (three of eight samples, 38 percent) had the next most frequent percentage of detections. The ranges of their detections were 2.1 to 6.5 $\mu\text{g/g}$ and 0.17 to 0.34 $\mu\text{g/g}$, respectively. Mercury had the lowest frequency of detected concentrations, 25 percent (three of 12 samples), and a range of 0.048 to 0.40 $\mu\text{g/g}$. Neither aldrin nor arsenic were detected in the samples. The analytical results for the soil and water samples from the vicinity of the Administration Building are in Section 4.1.3.1.

The omnivores were represented also by two western meadowlark samples and one Brewer's blackbird sample; all analytes were reported for each sample. The meadowlarks were collected in or close to Staked Site BS2-2 and in RMA Section 25. The blackbird was collected in RMA Section 1, near the warehouse just west of the CMP trailer. Two of these samples, one meadowlark and one blackbird, contained dieldrin (4.4 and 8.0 $\mu\text{g/g}$, respectively) and DDE (0.15 and 1.1 $\mu\text{g/g}$, respectively). The remaining meadowlark contained dieldrin (6.5 $\mu\text{g/g}$) and endrin (0.13 $\mu\text{g/g}$).

The carnivores are represented by one reptile (bull snake), four buteos (ferruginous hawk, red-tailed hawk, bald eagle, golden eagle), one owl (great horned owl), and one mammal (badger). The carnivores were collected in a variety of locations: bull snake, RMA Section 2; ferruginous hawk, RMA Section 25; red-tailed hawk, RMA Sections 1 and 35; great horned owl, near Staked Site BS4-1 and in RMA Sections 1 and 25; and badger, RMA Section 36. The bald eagle was a captive

bird held by the USFWS and fed for several months on prey items from RMA. The golden eagle was found electrocuted at Barr Lake. As above, there are a varying number of possible detections of each analyte because data for all analytes were not reported for every sample.

Dieldrin was the most frequently detected analyte (17 of 20 samples, 85 percent), and detected concentrations ranged from 0.11 in the bald eagle liver sample to 29 $\mu\text{g/g}$ in the badger fat sample. Dieldrin was found in all analyzed samples except the golden eagle liver and gizzard samples, and the sample of badger solid stomach contents. DDE was the next most frequently detected analyte (11 of 20 samples, 55 percent) and detected concentrations ranged from 0.12 to 1.7 $\mu\text{g/g}$. DDE was not detected in the bull snake; muscle tissue from the ferruginous hawk, both red-tailed hawks, one great horned owl, and the badger; or in brain, liquid or solid stomach tissue from the badger. Endrin was detected in 14 percent (three of 21) of the samples at concentrations ranging from 0.13 $\mu\text{g/g}$ in red-tailed hawk liver to 0.23 $\mu\text{g/g}$ in ferruginous hawk liver. The other detection was in bald eagle muscle tissue. Mercury was detected (four of 17 samples, 24 percent) at concentrations ranging from 0.049 to 0.076 $\mu\text{g/g}$. Three of the four detections were in liver tissue (ferruginous hawk, red-tailed hawk, and great horned owl), and one was in the muscle tissue of the same owl. DDT was detected in 8.7 percent of the 23 samples, in bald eagle liver and badger fat tissues. Aldrin and arsenic were not detected in these species.

A brief consideration of the effectiveness of the various tissues at evidencing the target analytes reveals specific trends. Of the eight times when liver and muscle tissue from the same specimen were each analyzed for dieldrin, dieldrin was detected in all eight of the muscle samples, and in four of the liver samples. Of the remaining liver samples, three had detected dieldrin but the analysis was out of control and the data were rejected because of QA/QC considerations; and one was below the lower certified reporting range for dieldrin. Liver samples contained detectable endrin in two cases where muscle samples did not; one pair of these tissues had both detected sample endrin values rejected, and one pair had endrin detected in muscle but not in liver. Endrin was detected in the badger solid stomach tissue but the data were rejected. It was not detected in any of the five other tissues from this specimen. DDT was detected in liver but not in muscle from the bald eagle specimen. It was also detected in badger fat, but not in the other tissues analyzed from this specimen. DDE was detected in the livers of two hawks, but not in the corresponding muscle samples; it was detected in both liver and muscle from the two eagles, as well as in the golden eagle gizzard sample. It was also detected in liver and fat, but not the other samples, from the badger. The detection of DDE in a muscle sample from one of the owls was associated with a liver sample that had rejected DDE data. Mercury was detected in liver tissue in three of the

four samples from which it was reported; one of the detections was in a muscle sample paired with one of these livers.

5.0 SUMMARY

5.1 Summary of Target Analyte Detections

5.1.1 Analytes

Dieldrin was the most ubiquitous of the seven target analytes quantified in samples of terrestrial biota collected in 1989. It was detected in at least one analyzed sample of every terrestrial species, sedentary or mobile. It was also detected in all terrestrial BSAs and in all staked sites except in BSAs 11 and 13 where sample sizes were small, and in the near peripheral area. No other organochlorine pesticide was detected at frequencies close to that of dieldrin, or with such geographic or taxonomic breadth. Compared to the 65 percent detection rate of dieldrin in terrestrial samples collected from contaminated BSAs and the near peripheral area on RMA, aldrin was detected in 4.2 percent of the samples, endrin in 11 percent, DDT in 5.9 percent, DDE in 6.4 percent, arsenic in 18.5 percent and mercury in 8.3 percent.

Dieldrin was detected in 3.8 percent of the terrestrial control samples, while DDE and DDT were detected in zero and 1.9 percent, respectively. Arsenic and mercury were detected in 10 percent and 3.6 percent, respectively, of the terrestrial samples from control areas. Neither aldrin nor endrin was detected in terrestrial control samples. Dieldrin was found in two samples from two staked control sites on RMA and in no samples from off-post control areas. DDE was not detected in control samples. Only one control detection of DDT was found. Arsenic was detected in 20 percent of the samples from off-post control areas. Mercury was found in only two samples, both from the same control area.

Dieldrin was also the most frequently detected analyte in aquatic biota. It was detected in 86 percent of the samples from BSAs on RMA. In particular, dieldrin was found in all vertebrate species sampled in all BSAs. DDE, with reportable concentrations in 41 percent of the aquatic samples analyzed, was the next most frequently detected OCP. Endrin was detected in 8.9 percent of the samples. DDT was detected in 3.6 percent of the samples. Aldrin was detected in 1.8 percent of the samples. Mercury was found in at least one sample of all vertebrate species in all BSAs, at a detection rate of 53 percent. In contrast, arsenic was detected in 19 percent of the aquatic samples from RMA BSAs.

DDE was the only OCP detected in samples from aquatic control areas. It was found in six of 34 (18 percent) samples. Arsenic was detected more frequently in samples from control areas (22 percent) than in samples from RMA BSAs (19 percent). USFWS geometric mean concentrations of arsenic for species by lake, when calculated, were higher in controls than in RMA samples. Mercury was detected more frequently in samples from RMA (51 percent) than in samples from control areas (42 percent). Concentrations of mercury in control samples were lower than in RMA samples for some species and higher for others.

5.1.2 Species

Results of the 1989 Biota CMP indicated that the sedentary terrestrial biota most indicative of local target analyte presence included cheatgrass, earthworms, ground beetles, and deer mice. Earthworms, in particular, provided good evidence of local sources of target analyte presence. All analytes were detected in earthworms, and this species also had the greatest percentage of samples with reportable concentrations of arsenic (100 percent) and mercury (71 percent). Ground beetles, a new species for 1989, were also good indicators of the target analytes and in fact provided detections of more analytes at generally higher concentrations than did grasshoppers.

Black-tailed prairie dogs and deer mice were the most likely species to reveal local sources of dieldrin contamination. A total of 88 percent of prairie dog and 79 percent of deer mouse samples contained reportable concentrations of dieldrin, and the highest dieldrin concentration (35 $\mu\text{g/g}$) in RMA biota was found in a deer mouse sample. Dieldrin was also found in reportable concentrations in 79 percent of the earthworm samples. Deer mouse samples also recorded the maximum program concentrations of aldrin (2.2 $\mu\text{g/g}$), DDT (0.27 $\mu\text{g/g}$), DDE (1.9 $\mu\text{g/g}$), and mercury (0.81 $\mu\text{g/g}$). Mourning doves and ring-necked pheasants were the best terrestrial avian indicators of target analyte presence. Mourning doves were particularly suitable indicators of endrin (29 percent detections vs. 11 percent for all terrestrial species samples).

In aquatic systems, killdeer, a new species for 1989, was the best overall indicator of target analyte presence. Mallards were also a good indicator species. Each of these species had detections for five of the target analytes, and when considered together, they evidenced six of the seven target analytes. Killdeer were more effective as aquatic indicator species of DDE, DDT, and endrin presence than any other aquatic species, while mallards had the greatest detections for dieldrin and the only aquatic detection of aldrin. Largemouth bass were effective indicators of the target analytes, including mercury, with generally higher frequencies and concentrations of this analyte

compared to the other fish species. Arsenic was only detected in aquatic plants and plankton on RMA. The highest concentration was found in a sample of sego pondweed.

6.0 REFERENCES CITED

- DeWeese, L., L. McEwen, and B. Petersen. 1982. Chemical contaminant residues and effects on kestrels and other wildlife of the Colorado Rocky Mountain Arsenal. Progress report, parts 1 and 2. U.S. Fish and Wildlife Service. RIC #87091R01.
- Ebasco Services Inc. 1986. Rocky Mountain Arsenal, Chemical Index, Vols. I and II. Geraghty and Miller, Inc. Final Report. RIC #88357R01.
- Ebasco Services Inc. 1988. final Phase II Data Addendum, North Plants Complex, Version 3.2.
- Ebasco Services Inc. 1989a. RMA Final Water Remedial Investigation Report, Vols. 1-5. Version 3.3. Prepared for U.S. Army Program Manager's Office for Rocky Mountain Arsenal Contamination Cleanup. RIC #89186R01.
- Ebasco Services Inc. 1989b. Comprehensive Monitoring Program. Procedures Manual. Volume 5, Biota Element. Contract DAA15-87-0095. Prepared for U.S. Army Program Manger's Office for Rocky Mountain Arsenal Contamination Cleanup.
- Ebasco Services Inc., Applied Environmental, Inc., CH2M HILL, DataChem, Inc., and R.L. Stollar and Associates, Inc. 1989a, May. Final Remedial Investigation Report, Southern Study Area, Vol. VI. Sections 1.0, 2.0 and 3.0 text. Proposed Final Report. Version 3.2. Contract No. DAAA15-88-D-0024. Prepared for U.S. Army Program Manager's Office for Rocky Mountain Arsenal Contamination Cleanup. RIC #89166R01.
- Ebasco Services Inc., Applied Environmental, Inc., CH2M HILL, DataChem, Inc., and R.L. Stollar and Associates, Inc. 1989b, May. Final Remedial Investigation Report, Western Study Area, Vol. XII. Sections 1.0, 2.0 and 3.0 text. Final Report. Version 3.3. Contract No. DAAA15-88-D-0024. Prepared for U.S. Army Program Manager's Office for Rocky Mountain Arsenal Contamination Cleanup. RIC #89166R03.
- Ebasco Services Inc., Applied Environmental, Inc., CH2M HILL, DataChem, Inc., and R.L. Stollar and Associates, Inc. 1989c, June. Black-tailed Prairie Dog Activity Survey, Interim Report. Contract No. DAAA15-88-D-0024. Prepared for U.S. Army Program Manager's Office for Rocky Mountain Arsenal Contamination Cleanup. RIC #89166R03.
- Ebasco Services Inc., Applied Environmental, Inc., CH2M HILL, DataChem, Inc., and R.L. Stollar and Associates, Inc. 1989d, June. Final Remedial Investigation Report, Eastern Study Area, Vol. VII. Sections 1.0, 2.0 and 3.0 text. Final Report. Version 3.3. Contract No. DAAA15-88-D-0024. Prepared for U.S. Army Program Manager's Office for Rocky Mountain Arsenal Contamination Cleanup. RIC #89166R02.
- Ebasco Services Inc., Applied Environmental, Inc., CH2M HILL, DataChem, Inc., and R.L. Stollar and Associates, Inc. 1989e, July. Final Remedial Investigation Report, North Plants Study Area, Vol. IX. Final Report. Version 3.3. Contract No. DAAA15-88-D-0024. Prepared for U.S. Army Program Manager's Office for Rocky Mountain Arsenal Contamination Cleanup. RIC #89166R05.

Ebasco Services Inc., Applied Environmental, Inc., CH2M HILL, DataChem, Inc., and R.L. Stollar and Associates, Inc. 1989f. Final Remedial Investigation Report, Central Study Area, Vol. X. Sections 1.0 and 2.0 text. Proposed Final Report. Version 3.2. Contract No. DAAA15-88-D-0024. Prepared for U.S. Army Program Manager's Office for Rocky Mountain Arsenal Contamination Cleanup. RIC #89166R06.

Ebasco Services Inc., Applied Environmental, Inc., CH2M HILL, DataChem, Inc., and R.L. Stollar and Associates, Inc. 1989g. Final Remedial Investigation Report, North Central Study Area, Vol. XI. Sections 2.0 and 3.0 text. Final Report. Version 3.3. Contract No. DAAA15-88-D-0024. Prepared for U.S. Army Program Manager's Office for Rocky Mountain Arsenal Contamination Cleanup. RIC #89166R07.

Ebasco Services Inc., Applied Environmental, Inc., CH2M HILL, DataChem, Inc., and R.L. Stollar and Associates, Inc. 1989h. Final Remedial Investigation Report, South Plants Study Area, Vol. VIII. Final Report. Version 3.3. Contract No. DAAA15-88-D-0024. Prepared for U.S. Army Program Manager's Office for Rocky Mountain Arsenal Contamination Cleanup. RIC #89166504.

Environmental Science and Engineering, Inc. (ESE). 1987, August. Biota Assessment. Final Phase II Technical Plan. Contract No. DAAK11-84-D-0016. Task 9. Prepared for U.S. Army Program Manager's Office for Rocky Mountain Arsenal Contamination Cleanup. RIC #88243R05.

Environmental Science and Engineering, Inc. 1988a, May. Water Quantity/Quality Survey-Final Screening Program Report-3rd/4th quarters. Prepared for U.S. Army Program Manager's Office for Rocky Mountain Arsenal Contamination Cleanup. RIC #88173R06.

Environmental Science and Engineering, Inc. 1988b, August. Air Remedial Investigation. Final Report. Version 3.1. Task 18. Prepared for U.S. Army Program Manager's Office for Rocky Mountain Arsenal Contamination Cleanup. RIC #88263R01.

Environmental Science and Engineering, Inc. 1988c, September. Bald Eagle Study. Winters 1986-1987, 1987-1988. Draft Final Report. Prepared for U.S. Army Program Manager's Office, Rocky Mountain Arsenal Contamination Cleanup. RIC #88293R09.

Environmental Science and Engineering, Inc. 1989, May. Biota Remedial Investigation. Final Report. Version 3.2. Contract No. DAAK11-84-D-0016. Task 9. Prepared for U.S. Army Program Manager's Office, Rocky Mountain Arsenal Contamination Cleanup. RIC #89173R02.

Finley, R.B., Jr. 1959. Investigations of waterfowl mortality at the Rocky Mountain Arsenal. Internal U.S. Fish and Wildlife Service Report, Denver Wildlife Research Center.

Hartley, G.S. and I.J. Graham-Bryce. 1980. Physical Principles of Pesticide Behavior. Academic Press, NY.

Hyman, J. Company. 1953a, July. Denver Plant, Monthly Operating Report, Caustic-Chlorine Plant Operations. Microfilm RSH 881, frames 0806-0807.

Jensen, W.I. 1955. Waterfowl Mortality, Rocky Mountain Arsenal, Summary Report. U.S. Fish and Wildlife Service Internal Report. Denver, CO. RIC #84293R04.

- Küchler, A.W. 1964. Potential Natural Vegetation of the Conterminous United States. American Geographical Society Special Publication 36, 1965 rev., NY.
- McEwen, L.C. and L.R. DeWeese. 1985. Preliminary investigations of Aldrin, Dieldrin, Endrin, and Mercury Residues in Eggs and Young of Waterfowl Nesting at the Rocky Mountain Arsenal. Special USFWS Report, Patuxent Wildlife Research Center, Rocky Mountain Field Station, Fort Collins, CO. RIC #87091R04.
- Morrison-Knudson Engineers, Inc. (MKE). 1987, August. Phase I Literature Review. Aquatic Resources Investigation, Rocky Mountain Arsenal. RIC #88011R03.
- Morrison-Knudson Engineers, Inc. 1988. Geology of Denver Basin.
- Morrison-Knudson Engineers, Inc. 1989. Geology of the RMA, Adams County, CO. Project 1680.
- Morrison-Knudson Engineers, Inc. 1989a, August. Wildlife Resources of the Rocky Mountain Arsenal, Adams County, CO.
- Morrison-Knudson Engineers, Inc. 1989b, October. Vegetation Resources of Rocky Mountain Arsenal, Adams County, Colorado. Project 1680.
- Midwest Research Institute (MRI). 1988, December. Certification Calibration Data and Analytical Method No. G6, Analysis of Arsenic in Biota Samples by Graphite Furnace Atomic Absorption Spectroscopy. Prepared for U.S. Army Program Manager's Office, Rocky Mountain Arsenal Contamination Cleanup.
- MRI. 1989a, January. Certification Calibration Data and Analytical Method No. H-6, Analysis of Organochlorine Pesticides in Fat Tissue by Gas Chromatography/Electron Capture Detection (GC/ECD). Prepared for U.S. Army Program Manager's Office, Rocky Mountain Arsenal Contamination Cleanup.
- MRI. 1989b, May. Certification Calibration Data and Analytical Method: Animal Tissue J6A, Plant Tissue J6P, Analysis of Mercury in Biota Samples by Cold Vapor Atomic Absorption Spectroscopy. Prepared for U.S. Army Program Manager's office, Rocky Mountain Arsenal Contamination Cleanup.
- MRI. 1989c, October. Certification Calibration Data and Analytical Method No.K-6, Analysis of Organochlorine Pesticides in Non-Fat Tissue by Gas Chromatography/Electron Capture Detection (GC/ECD), Revision 2. Prepared for U.S. Army Program Manager's Office, Rocky Mountain Arsenal Cleanup.
- Mullan, J. 1971. Fishery Management Program. Annual Project Report, Rocky Mountain Arsenal. U.S. Dept. of the Interior, Fish and Wildlife Service. Vernal, Utah. RIC #84292R03.
- National Oceanic and Atmospheric Administration (NOAA). 1957-1976. Climatic Data.
- Parsons and ESI (Parsons, R.M. and Company, and Engineering-Science, Inc.). 1983, April. Environmental Assessment, Stapleton International Airport, for City and County of Denver. RIC #85128R02.

- Rocky Mountain Fisheries Consultants, Inc. 1978. Preliminary Biological Inventory of Aquatic Life on Rocky Mountain Arsenal.
- Rosenlund, B. 1981. Rocky Mountain Arsenal Fisheries Assistance Report, 1981. U.S. Fish and Wildlife Service. RIC #86213R01.
- Rosenlund, B., D. Jennings, B. Kurey, T. Jackson, and E. Bergerson. 1986. Contaminants in Aquatic Systems at the Rocky Mountain Arsenal. Final Report. 1984. RIC #86041R02.
- Sciple, G.W. 1952. Study of Avian Mortality of Three Lakes at the Rocky Mountain Arsenal, Denver, Colorado. Wildlife Research Laboratory, Denver, CO. Special Report. May 28, 1952. RIC #84269R01.
- Sheldon, M.G., M.H. Mohn, and R.A. Wilson. 1963. Movement and Accumulation of Aldrin in Lakes at Rocky Mountain Arsenal, Colorado, in Relation to Waterfowl Losses. Annual Progress Report. Denver Wildlife Research Center. December 31, 1962. RIC #84296R04.
- Shelford, V.E. 1963. The Ecology of North America. University of Illinois Press, Urbana.
- Stollar (R.L. Stollar and Associates, Inc.), Harding Lawson Associates, Ebasco Services Inc., DataChem, Inc., Enseco-Cal Lab and Midwest Research Institute. 1988. Comprehensive Monitoring Program. Health and Safety Plan, Final Version. Contract No. DAAA15-87-C-0095. Prepared for the U.S. Army Program Manager's Office for Rocky Mountain Arsenal Contamination Cleanup.
- Stollar, Harding Lawson Associates, Ebasco Services Inc., DataChem, Inc., Enseco-Cal Laboratories, and Midwest Research Institute. June, 1990. Comprehensive Monitoring Program. Final Technical Plan. Version 3.1, Biota. Contract No. DAAA15-87-0095. Prepared for the U.S. Army Program Manager's Office for Rocky Mountain Arsenal Contamination Cleanup.
- Stollar, Harding Lawson Associates, Ebasco Services Inc., DataChem, Inc., Enseco-Cal Laboratories, and Midwest Research Institute. June, 1990. Comprehensive Monitoring Program. Final Surface Water Data Assessment Report. Version 2.0, Volumes I, II, and III. Contract No. DAAA15-87-0095. Prepared for the U.S. Army Program Manager's Office for Rocky Mountain Arsenal Contamination Cleanup.
- Stollar, Harding Lawson Associates, Ebasco Services Inc., DataChem, Inc., Enseco-Cal Laboratories, and Midwest Research Institute. 1989c, October. Comprehensive Monitoring Program. Air Quality Data Assessment Report. Final Report. Version 2.0, Volumes I and II. Contract No. DAAA15-87-0095. Prepared for the U.S. Army Program Manager's Office for Rocky Mountain Arsenal Contamination Cleanup.
- Stollar, Harding Lawson Associates, Ebasco Services Inc., DataChem, Inc., Enseco-Cal Laboratories, and Midwest Research Institute. 1990, March. Comprehensive Monitoring Program. 1988 Biota Annual Report. Final Report. Version 2.0, Volumes I, II and III. Contract No. DAAA15-87-0095. Prepared for the U.S. Army Program Manager's Office for Rocky Mountain Arsenal Contamination Cleanup.
- Sudershan, P. and M.A.Q. Khan. 1980. Metabolic fate of ^{14}C -Endrin in Bluegill Fish. Pesticide Biochemistry and Physiology 14:5-12.

- Sukol, R., E. Woolson, and W. Thompson. 1987. Fate and Persistence in Soil of Selected Toxic Organic Chemicals. Office of Health and Environmental Assessment. U.S. EPA, Washington, D.C. EPA/600/6-87/003.
- Thorne, D.S., J.D. McBride, C.R. Legros, J.O. Ellis, and M.S. Manlove. 1979, July. Biological Monitoring of Pesticides, Heavy Metals, and Other Contaminants at Rocky Mountain Arsenal. Department of the Army, RMA, Commerce City, CO. RIC #81286R06.
- U.S. Army Toxic and Hazardous Materials Agency (USATHAMA). 1987a. USATHAMA QA Program-December, 1985. Second edition. March 1987. RIC #89114R01.
- USATHAMA. 1987b. User's Manual for the Installation Restoration Data Management System (IRDMS) for the IBM PC/XT or PC/AT. Prepared by Potomac Research, Inc.
- U.S. Dept. of Agriculture-Soil Conservation Service (USDA-SCS). 1974. Soil Survey of Adams County, CO.
- U.S. Dept. of Commerce-National Oceanic and Atmospheric Administration (USDC-NOAA). 1957-1976. Climatic Data.
- U.S. Dept. of Interior-Environmental Protection Agency (USDI-EPA). 1979. Reviews of the environmental Effects of Pollutants: XII Endria. Office of Research and Development. Health Effects Research Laboratory. Cincinnati, OH. EPA-600/1-79-005.
- Walsh, J.P. and Associates, Inc. 1988. Soil Investigation and Inventory of the Rocky Mountain Arsenal. Preliminary Draft.
- Williams, J. 1981, July 29. Vegetation Factors. Subtask 15.8. Thorne Ecological Institute.

Table 4.1-1 Aldrin Statistical Results for Terrestrial Species on RMA in 1989

Page 1 of 3

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
ACRI - grasshopper							
CMP-BSA 1	0	5	BCRL	BCRL	NA	NA	NA
2	0	5	BCRL	BCRL	NA	NA	NA
3	0	4	BCRL	BCRL	NA	NA	NA
4	0	4	BCRL	BCRL	NA	NA	NA
5	0	3	BCRL	BCRL	NA	NA	NA
11	0	1	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	22	BCRL	BCRL	NA	NA	NA
Control	0	5	BCRL	BCRL	NA	NA	NA
ATCU - burrowing owl							
CMP-BSA 3	0	1	BCRL	BCRL	NA	NA	NA
N	0	1	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	2	BCRL	BCRL	NA	NA	NA
Control		0	NA	NA	NA	NA	NA
BRTE - cheatgrass							
CMP-BSA 1	0	4	BCRL	BCRL	NA	NA	NA
2	0	5	BCRL	BCRL	NA	NA	NA
3	0	4	BCRL	BCRL	NA	NA	NA
4	0	3	BCRL	BCRL	NA	NA	NA
5	0	5	BCRL	BCRL	NA	NA	NA
11	0	3	BCRL	BCRL	NA	NA	NA
12	1	2	0.254	0.254	0.0458	355	11.3
All RMA CMP-BSAs	1	26	0.254	0.254	NC	NC	NC
Control	0	6	BCRL	BCRL	NA	NA	NA
COLE - ground beetle							
CMP-BSA 1	1	3	0.0368	0.0368	NC	NC	NC
2	2	3	0.0160	0.0569	0.0114	25.7	6.06
5	0	2	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	3	8	0.0160	0.0569	NC	NC	NC
Control	0	3	BCRL	BCRL	NA	NA	NA
CYLU - prairie dog							
CMP-BSA 1	0	10	BCRL	BCRL	NA	NA	NA
2	0	8	BCRL	BCRL	NA	NA	NA
3	0	10	BCRL	BCRL	NA	NA	NA
11	0	1	BCRL	BCRL	NA	NA	NA
12	0	3	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	32	BCRL	BCRL	NA	NA	NA
Control	0	10	BCRL	BCRL	NA	NA	NA
HEAN - sunflower							
CMP-BSA 1	**	4					
2	**	5					
3	**	4					
4	**	4					
5	**	4					
11	**	2					
All RMA CMP-BSAs	**	23					
Control	**	5					

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

**Sample analysis has been delayed pending completion of laboratory certification.

BCRL = Sites examined with aldrin concentrations below lower certified reporting limit of 0.103 µg/g (MRI) or 0.013 µg/g (ESE) for animal tissue and 0.0663 µg/g (MRI) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

Table 4.1-1 Aldrin Statistical Results for Terrestrial Species on RMA in 1989

Page 2 of 3

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
KOIR - kochia							
CMP-BSA 1	1	3	0.0970	0.0970	NC	NC	NC
2	0	4	BCRL	BCRL	NA	NA	NA
3	0	2	BCRL	BCRL	NA	NA	NA
5	0	5	BCRL	BCRL	NA	NA	NA
11	0	1	BCRL	BCRL	NA	NA	NA
12	0	2	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	1	17	0.0970	0.0970	NC	NC	NC
Control	0	5	BCRL	BCRL	NA	NA	NA
LASE - prickly lettuce							
CMP-BSA 1	0	3	BCRL	BCRL	NA	NA	NA
2	0	1	BCRL	BCRL	NA	NA	NA
3	0	2	BCRL	BCRL	NA	NA	NA
4	0	2	BCRL	BCRL	NA	NA	NA
5	0	1	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	9	BCRL	BCRL	NA	NA	NA
Control	0	2	BCRL	BCRL	NA	NA	NA
OLIG - earthworm							
CMP-BSA 1	0	2	BCRL	BCRL	NA	NA	NA
2	0	3	BCRL	BCRL	NA	NA	NA
3	0	3	BCRL	BCRL	NA	NA	NA
4	1	3	0.447	0.447	NC	NC	NC
5	0	5	BCRL	BCRL	NA	NA	NA
11	0	2	BCRL	BCRL	NA	NA	NA
12	0	2	BCRL	BCRL	NA	NA	NA
13	0	4	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	1	24	0.447	0.447	NC	NC	NC
Control	0	5	BCRL	BCRL	NA	NA	NA
PEMA - deer mouse							
CMP-BSA 1	0	5	BCRL	BCRL	NA	NA	NA
2	0	5	BCRL	BCRL	NA	NA	NA
3	2	4	0.167	0.337	0.0553	18.4	5.51
4	1	4	2.20	2.20	NC	NC	NC
5	0	5	BCRL	BCRL	NA	NA	NA
11	0	3	BCRL	BCRL	NA	NA	NA
12	0	2	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	3	28	0.167	2.20	NC	NC	NC
Control	0	5	BCRL	BCRL	NA	NA	NA

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

**Sample analysis has been delayed pending completion of laboratory certification.

BCRL = Sites examined with aldrin concentrations below lower certified reporting limit of 0.103 µg/g (MRI) or 0.013 µg/g (ESE) for animal tissue and 0.0663 µg/g (MRI) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

Table 4.1-1 Aldrin Statistical Results for Terrestrial Species on RMA in 1989

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
PHCO - pheasant							
All Samples							
CMP-BSA 2	0	7	BCRL	BCRL	NA	NA	NA
3	0	4	BCRL	BCRL	NA	NA	NA
5	0	6	BCRL	BCRL	NA	NA	NA
11	0	6	BCRL	BCRL	NA	NA	NA
N	0	2	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	25	BCRL	BCRL	NA	NA	NA
Control	0	6	BCRL	BCRL	NA	NA	NA
Dressed carcass							
CMP-BSA 2	0	4	BCRL	BCRL	NA	NA	NA
3	0	2	BCRL	BCRL	NA	NA	NA
5	0	3	BCRL	BCRL	NA	NA	NA
11	0	3	BCRL	BCRL	NA	NA	NA
N	0	1	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	13	BCRL	BCRL	NA	NA	NA
Control	0	3	BCRL	BCRL	NA	NA	NA
Liver							
CMP-BSA 2	0	3	BCRL	BCRL	NA	NA	NA
3	0	2	BCRL	BCRL	NA	NA	NA
5	0	3	BCRL	BCRL	NA	NA	NA
11	0	3	BCRL	BCRL	NA	NA	NA
N	0	1	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	12	BCRL	BCRL	NA	NA	NA
Control	0	3	BCRL	BCRL	NA	NA	NA
STNE - western meadowlark							
CMP-BSA 2	0	5	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	5	BCRL	BCRL	NA	NA	NA
ZEMA - mourning dove							
CMP-BSA 1	0	6	BCRL	BCRL	NA	NA	NA
2	1	8	0.0227	0.0227	NC	NC	NC
3	0	6	BCRL	BCRL	NA	NA	NA
4	0	11	BCRL	BCRL	NA	NA	NA
5	0	5	BCRL	BCRL	NA	NA	NA
12	0	2	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	1	38	0.0227	0.0227	NC	NC	NC
Control	0	5	BCRL	BCRL	NA	NA	NA

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

**Sample analysis has been delayed pending completion of laboratory certification.

BCRL = Sites examined with aldrin concentrations below lower certified reporting limit of 0.103 µg/g (MRI) or 0.013 µg/g (ESE) for animal tissue and 0.0663 µg/g (MRI) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

Table 4.1-2 Dieldrin Statistical Results for Terrestrial Species on RMA in 1989

Page 1 of 3

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
ACRI - grasshopper							
CMP-BSA 1	2	5	0.478	0.536	NC	NC	NC
2	3	5	0.0916	0.409	0.0455	64.5	7.70
3	3	4	0.344	1.60	0.213	655	12.8
4	2	4	0.268	0.694	0.0476	757	13.1
5	0	3	BCRL	BCRL	NA	NA	NA
11	0	1	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	10	22	0.0916	1.60	NC	NC	NC
Control	0	5	BCRL	BCRL	NA	NA	NA
ATCU - burrowing owl							
CMP-BSA 3	1	1	0.130	0.130	0.130	1.00	1.06
N	1	1	0.114	0.114	0.114	1.00	1.06
All RMA CMP-BSAs	2	2	0.114	0.130	0.122	1.01	1.10
Control		0	NA	NA	NA	NA	NA
BRTB - cheatgrass							
CMP-BSA 1	3	4	0.0688	0.223	0.0557	34.1	6.54
2	2	5	0.0642	0.0688	NC	NC	NC
3	2	3	0.0867	0.124	0.0341	42.2	6.92
4	2	3	0.0716	0.156	0.0345	49.6	7.21
5	2	5	0.145	0.145	NC	NC	NC
11	0	3	BCRL	BCRL	NA	NA	NA
12	0	2	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	11	25	0.0642	0.223	NC	NC	NC
Control	0	6	BCRL	BCRL	NA	NA	NA
COLE - ground beetle							
CMP-BSA 1	3	3	0.132	3.81	0.557	20.1	5.66
2	3	3	1.43	2.19	1.68	1.05	1.26
5	2	2	0.215	1.24	0.516	4.64	3.45
All RMA CMP-BSAs	8	8	0.132	3.81	0.827	4.22	3.32
Control	2	3	0.0343	0.0368	0.0112	53.2	7.34
CYLU - prairie dog							
CMP-BSA 1	10	10	0.0622	0.249	0.128	1.30	1.67
2	6	7	0.0200	0.189	0.0542	4.88	3.52
3	8	10	0.0235	0.219	0.0313	11.3	4.75
11	0	1	BCRL	BCRL	NA	NA	NA
12	3	3	0.0296	0.125	0.0521	1.80	2.15
All RMA CMP-BSAs	27	31	0.0200	0.249	0.0527	7.45	4.12
Control	0	10	BCRL	BCRL	NA	NA	NA
HEAN - sunflower							
CMP-BSA 1	**	4					
2	**	5					
3	**	4					
4	**	4					
5	**	4					
11	**	2					
All RMA CMP-BSAs	**	23					
Control	**	5					

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

**Sample analysis has been delayed pending completion of laboratory certification.

BCRL = Sites examined with dieldrin concentrations below lower certified reporting limit of 0.0840 µg/g (MRI) or 0.018 µg/g (ESE) for animal tissue and 0.0592 µg/g (MRI) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

Table 4.1-2 Dieldrin Statistical Results for Terrestrial Species on RMA in 1989

Page 2 of 3

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
KOIR - kochia							
CMP-BSA 1	1	3	0.0853	0.0853	NC	NC	NC
2	0	4	BCRL	BCRL	NA	NA	NA
3	0	2	BCRL	BCRL	NA	NA	NA
5	0	5	BCRL	BCRL	NA	NA	NA
11	0	1	BCRL	BCRL	NA	NA	NA
12	0	2	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	1	17	0.0853	0.0853	NC	NC	NC
Control	0	5	BCRL	BCRL	NA	NA	NA
LASE - prickly lettuce							
CMP-BSA 1	1	3	0.0633	0.0633	NC	NC	NC
2	0	1	BCRL	BCRL	NA	NA	NA
3	2	2	0.120	0.336	0.201	1.70	2.07
4	1	2	0.0743	0.0743	0.0166	90.8	8.36
5	0	1	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	4	9	0.0633	0.336	NC	NC	NC
Control	0	2	BCRL	BCRL	NA	NA	NA
OLIG - earthworm							
CMP-BSA 1	2	2	0.328	0.682	0.473	1.31	1.68
2	3	3	0.188	3.60	0.933	9.27	4.45
3	2	3	0.104	0.275	0.0532	70.5	7.87
4	3	3	0.175	2.40	0.679	5.59	3.71
5	4	5	0.337	2.70	0.258	235	10.3
11	2	2	0.0876	0.111	0.986	1.03	1.18
12	2	2	0.539	0.655	0.594	1.02	1.15
13	1	4	0.161	0.161	NC	NC	NC
All RMA CMP-BSAs	19	24	0.0876	3.60	0.176	77.3	8.05
Control	0	5	BCRL	BCRL	NA	NA	NA
PEMA - deer mouse							
CMP-BSA 1	3	3	0.579	11.0	3.38	11.3	4.75
2	4	4	0.300	2.00	0.707	2.38	2.54
3	4	4	0.332	9.10	3.04	9.64	4.50
4	4	4	4.90	35.0	10.4	2.05	2.33
5	3	5	0.127	2.40	0.0824	1640	15.2
11	0	3	BCRL	BCRL	NA	NA	NA
12	1	2	0.113	0.113	0.0244	111	8.76
All RMA CMP-BSAs	19	25	0.113	35.0	0.457	6001	19.1
Control	0	5	BCRL	BCRL	NA	NA	NA

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

**Sample analysis has been delayed pending completion of laboratory certification.

BCRL = Sites examined with dieldrin concentrations below lower certified reporting limit of 0.0840 µg/g (MRI) or 0.018 µg/g (ESE) for animal tissue and 0.0592 µg/g (MRI) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

Table 4.1-2 Dieldrin Statistical Results for Terrestrial Species on RMA in 1989

Page 3 of 3

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
PHCO - pheasant							
All Samples							
CMP-BSA 2	7	7	0.0885	0.930	0.296	3.06	2.88
3	4	4	0.0544	0.457	0.216	2.76	2.74
5	4	6	0.158	5.95	0.115	2690000	46.9
11	0	6	BCRL	BCRL	NA	NA	NA
N	1	2	0.0453	0.0453	0.00700	924	13.6
All RMA CMP-BSAs	16	25	0.0453	5.95	0.0437	918	20.5
Control	0	6	BCRL	BCRL	NA	NA	NA
Dressed carcass							
CMP-BSA 2	4	4	0.0885	0.203	0.130	1.12	1.41
3	2	2	0.0544	0.190	0.102	2.19	2.42
5	2	3	0.158	4.76	0.0946	45300000	66.6
11	0	3	BCRL	BCRL	NA	NA	NA
N	0	1	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	8	13	0.0544	4.76	0.0270	2710	16.6
Control	0	3	BCRL	BCRL	NA	NA	NA
Liver							
CMP-BSA 2	3	3	0.867	0.930	0.890	1.00	1.04
3	2	2	0.457	0.457	0.457	1.00	1.00
5	2	3	0.419	5.95	0.141	233000000	80.6
11	0	3	BCRL	BCRL	NA	NA	NA
N	1	1	0.0453	0.0453	0.0453	1.00	1.00
All RMA CMP-BSAs	8	12	0.0453	5.95	0.0739	44700	26.4
Control	0	3	BCRL	BCRL	NA	NA	NA
STNE - western meadowlark							
CMP-BSA 2	5	5	0.0370	1.62	0.140	8.78	4.37
All RMA CMP-BSAs	5	5	0.0370	1.62	0.140	8.78	4.37
ZEMA - mourning dove							
CMP-BSA 1	4	6	0.0334	8.00	0.0492	126000	30.8
2	7	8	0.0971	3.81	0.444	1170	14.3
3	5	6	0.183	2.00	0.208	1270	14.5
4	7	11	0.0750	1.71	0.0527	27700	24.5
5	1	5	0.0243	0.0243	NC	NC	NC
12	2	2	0.0497	1.52	0.275	347	11.2
All RMA CMP-BSAs	26	38	0.0243	8.00	0.0723	17400	22.7
Control	0	5	BCRL	BCRL	NA	NA	NA

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

**Sample analysis has been delayed pending completion of laboratory certification.

BCRL = Sites examined with dieldrin concentrations below lower certified reporting limit of 0.0840 µg/g (MRI) or 0.018 µg/g (ESE) for animal tissue and 0.0592 µg/g (MRI) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

Table 4.1-3 Endrin Statistical Results for Terrestrial Species on RMA in 1989

Page 1 of 3

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
ACRI - grasshopper							
CMP-BSA 1	1	5	0.155	0.155	NC	NC	NC
2	0	5	BCRL	BCRL	NA	NA	NA
3	0	4	BCRL	BCRL	NA	NA	NA
4	1	4	0.233	0.233	NC	NC	NC
5	1	3	0.981	0.981	NC	NC	NC
11	0	1	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	3	22	0.155	0.981	NC	NC	NC
Control	0	5	BCRL	BCRL	NA	NA	NA
ATCU - burrowing owl							
CMP-BSA 3	0	1	BCRL	BCRL	NA	NA	NA
N	0	1	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	2	BCRL	BCRL	NA	NA	NA
Control		0	NA	NA	NA	NA	NA
BRTE - cheatgrass							
CMP-BSA 1	0	4	BCRL	BCRL	NA	NA	NA
2	0	5	BCRL	BCRL	NA	NA	NA
3	0	4	BCRL	BCRL	NA	NA	NA
4	0	3	BCRL	BCRL	NA	NA	NA
5	1	5	0.0963	0.0963	NC	NC	NC
11	0	3	BCRL	BCRL	NA	NA	NA
12	0	2	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	1	26	0.0963	0.0963	NC	NC	NC
Control	0	6	BCRL	BCRL	NA	NA	NA
COLE - ground beetle							
CMP-BSA 1	1	3	0.237	0.237	NC	NC	NC
2	3	3	0.0646	0.0975	0.0769	1.05	1.24
5	0	2	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	4	8	0.0646	0.237	0.0107	384	11.5
Control	0	3	BCRL	BCRL	NA	NA	NA
CYLU - prairie dog							
CMP-BSA 1	0	10	BCRL	BCRL	NA	NA	NA
2	0	8	BCRL	BCRL	NA	NA	NA
3	0	10	BCRL	BCRL	NA	NA	NA
11	0	1	BCRL	BCRL	NA	NA	NA
12	0	3	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	32	BCRL	BCRL	NA	NA	NA
Control	0	10	BCRL	BCRL	NA	NA	NA
HEAN - sunflower							
CMP-BSA 1	**	4	BCRL	BCRL	NA	NA	NA
2	**	5	0.105	0.105	NC	NA	NA
3	**	4	BCRL	BCRL	NA	NA	NA
4	**	4	BCRL	BCRL	NA	NA	NA
5	**	4	BCRL	BCRL	NA	NA	NA
11	**	2					
All RMA CMP-BSAs	**	23	0.105	0.105	NC	NA	NA
Control	**	5	BCRL	BCRL	NA	NA	NA

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

**Sample analysis has been delayed pending completion of laboratory certification.

BCRL = Sites examined with endrin concentrations below lower certified reporting limit of 0.0740 µg/g (MRI) or 0.036 µg/g (ESE) for animal tissue and 0.0465 µg/g (MRI) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

Table 4.1-3 Endrin Statistical Results for Terrestrial Species on RMA in 1989

Page 2 of 3

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
KOIR - kochia							
CMP-BSA 1	0	3	BCRL	BCRL	NA	NA	NA
2	0	4	BCRL	BCRL	NA	NA	NA
3	0	2	BCRL	BCRL	NA	NA	NA
5	0	5	BCRL	BCRL	NA	NA	NA
11	0	1	BCRL	BCRL	NA	NA	NA
12	0	2	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	17	BCRL	BCRL	NA	NA	NA
Control	0	5	BCRL	BCRL	NA	NA	NA
LASE - prickly lettuce							
CMP-BSA 1	0	3	BCRL	BCRL	NA	NA	NA
2	0	1	BCRL	BCRL	NA	NA	NA
3	0	2	BCRL	BCRL	NA	NA	NA
4	0	2	BCRL	BCRL	NA	NA	NA
5	0	1	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	9	BCRL	BCRL	NA	NA	NA
Control	0	2	BCRL	BCRL	NA	NA	NA
OLIG - earthworm							
CMP-BSA 1	0	2	BCRL	BCRL	NA	NA	NA
2	1	2	0.561	0.561	0.0360	3530000	48.6
3	0	3	BCRL	BCRL	NA	NA	NA
4	0	3	BCRL	BCRL	NA	NA	NA
5	0	4	BCRL	BCRL	NA	NA	NA
11	0	2	BCRL	BCRL	NA	NA	NA
12	0	0	NA	NA	NA	NA	NA
13	0	4	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	1	20	0.561	0.561	NC	NC	NC
Control	0	5	BCRL	BCRL	NA	NA	NA
PEMA - deer mouse							
CMP-BSA 1	1	5	0.0934	0.0934	NC	NC	NC
2	0	5	BCRL	BCRL	NA	NA	NA
3	0	4	BCRL	BCRL	NA	NA	NA
4	0	4	BCRL	BCRL	NA	NA	NA
5	0	5	BCRL	BCRL	NA	NA	NA
11	0	3	BCRL	BCRL	NA	NA	NA
12	0	2	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	1	28	0.0934	0.0934	NC	NC	NC
Control	0	5	BCRL	BCRL	NA	NA	NA

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

**Sample analysis has been delayed pending completion of laboratory certification.

BCRL = Sites examined with endrin concentrations below lower certified reporting limit of 0.0740 µg/g (MRI) or 0.036 µg/g (ESE) for animal tissue and 0.0465 µg/g (MRI) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

Table 4.1-3 Endrin Statistical Results for Terrestrial Species on RMA in 1989

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
PHCO - pheasant							
All Samples							
CMP-BSA 2	0	7	BCRL	BCRL	NA	NA	NA
3	0	4	BCRL	BCRL	NA	NA	NA
5	0	6	BCRL	BCRL	NA	NA	NA
11	0	6	BCRL	BCRL	NA	NA	NA
N	0	2	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	25	BCRL	BCRL	NA	NA	NA
Control	0	6	BCRL	BCRL	NA	NA	NA
Dressed carcass							
CMP-BSA 2	0	4	BCRL	BCRL	NA	NA	NA
3	0	2	BCRL	BCRL	NA	NA	NA
5	0	3	BCRL	BCRL	NA	NA	NA
11	0	3	BCRL	BCRL	NA	NA	NA
N	0	1	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	13	BCRL	BCRL	NA	NA	NA
Control	0	3	BCRL	BCRL	NA	NA	NA
Liver							
CMP-BSA 2	0	3	BCRL	BCRL	NA	NA	NA
3	0	2	BCRL	BCRL	NA	NA	NA
5	0	3	BCRL	BCRL	NA	NA	NA
11	0	3	BCRL	BCRL	NA	NA	NA
N	0	1	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	12	BCRL	BCRL	NA	NA	NA
Control	0	3	BCRL	BCRL	NA	NA	NA
STNE - western meadowlark							
CMP-BSA 2	0	5	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	5	BCRL	BCRL	NA	NA	NA
ZEMA - mourning dove							
CMP-BSA 1	1	6	0.218	0.218	NC	NC	NC
2	6	8	0.0732	0.338	0.0428	210	10.1
3	2	6	0.0529	0.102	NC	NC	NC
4	1	11	0.253	0.253	NC	NC	NC
5	0	5	BCRL	BCRL	NA	NA	NA
12	1	2	0.0779	0.0779	0.00936	7930	20.0
All RMA CMP-BSAs	11	38	0.0529	0.338	NC	NC	NC
Control	0	5	BCRL	BCRL	NA	NA	NA

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

**Sample analysis has been delayed pending completion of laboratory certification.

BCRL = Sites examined with endrin concentrations below lower certified reporting limit of 0.0740 µg/g (MRI) or 0.036 µg/g (ESE) for animal tissue and 0.0465 µg/g (MRI) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

Table 4.1-4 DDT Statistical Results for Terrestrial Species on RMA in 1989

Page 1 of 3

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
ACRI - grasshopper							
CMP-BSA 1	0	5	BCRL	BCRL	NA	NA	NA
2	1	5	0.143	0.143	NC	NC	NC
3	0	4	BCRL	BCRL	NA	NA	NA
4	1	4	0.182	0.182	NC	NC	NC
5	0	3	BCRL	BCRL	NA	NA	NA
11	1	1	0.134	0.134	0.134	1.00	1.00
All RMA CMP-BSAs	3	22	0.134	0.182	NC	NC	NC
Control	0	5	BCRL	BCRL	NA	NA	NA
ATCU - burrowing owl							
CMP-BSA 3	0	1	BCRL	BCRL	NA	NA	NA
N	0	1	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	2	BCRL	BCRL	NA	NA	NA
Control	0	0	NA	NA	NA	NA	NA
BRTE - cheatgrass							
CMP-BSA 1	0	4	BCRL	BCRL	NA	NA	NA
2	0	5	BCRL	BCRL	NA	NA	NA
3	0	4	BCRL	BCRL	NA	NA	NA
4	0	3	BCRL	BCRL	NA	NA	NA
5	1	5	0.117	0.117	NC	NC	NC
11	0	3	BCRL	BCRL	NA	NA	NA
12	1	2	0.118	0.118	0.00832	1290000	42.6
All RMA CMP-BSAs	2	26	0.117	0.118	NC	NC	NC
Control	0	6	BCRL	BCRL	NA	NA	NA
COLE - ground beetle							
CMP-BSA 1	0	3	BCRL	BCRL	NA	NA	NA
2	0	3	BCRL	BCRL	NA	NA	NA
5	0	2	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	8	BCRL	BCRL	NA	NA	NA
Control	0	3	BCRL	BCRL	NA	NA	NA
CYLU - prairie dog							
CMP-BSA 1	0	10	BCRL	BCRL	NA	NA	NA
2	0	8	BCRL	BCRL	NA	NA	NA
3	1	10	0.159	0.159	NC	NC	NC
11	0	1	BCRL	BCRL	NA	NA	NA
12	0	3	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	1	32	0.159	0.159	NC	NC	NC
Control	0	10	BCRL	BCRL	NA	NA	NA
HEAN - sunflower							
CMP-BSA 1	**	4					
2	**	5					
3	**	4					
4	**	4					
5	**	4					
11	**	2					
All RMA CMP-BSAs	**	23					
Control	**	5					

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

**Sample analysis has been delayed pending completion of laboratory certification.

BCRL = Sites examined with DDT concentrations below lower certified reporting limit of 0.118 µg/g (MRI) or 0.132 µg/g (ESE) for animal tissue and 0.0753 µg/g (MRI) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

Table 4.1-4 DDT Statistical Results for Terrestrial Species on RMA in 1989

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
KOIR - kochia							
CMP-BSA 1	0	3	BCRL	BCRL	NA	NA	NA
2	1	4	0.0908	0.0908	NC	NC	NC
3	0	2	BCRL	BCRL	NA	NA	NA
5	0	5	BCRL	BCRL	NA	NA	NA
11	0	1	BCRL	BCRL	NA	NA	NA
12	0	2	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	1	17	0.0908	0.0908	NC	NC	NC
Control	0	5	BCRL	BCRL	NA	NA	NA
LASE - prickly lettuce							
CMP-BSA 1	0	3	BCRL	BCRL	NA	NA	NA
2	0	1	BCRL	BCRL	NA	NA	NA
3	0	2	BCRL	BCRL	NA	NA	NA
4	0	2	BCRL	BCRL	NA	NA	NA
5	0	1	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	9	BCRL	BCRL	NA	NA	NA
Control	0	2	BCRL	BCRL	NA	NA	NA
OLIG - earthworm							
CMP-BSA 1	1	2	0.259	0.259	0.0154	7990000	53.9
2	0	3	BCRL	BCRL	NA	NA	NA
3	0	3	BCRL	BCRL	NA	NA	NA
4	0	3	BCRL	BCRL	NA	NA	NA
5	2	5	0.155	0.177	NC	NC	NC
11	0	2	BCRL	BCRL	NA	NA	NA
12	0	2	BCRL	BCRL	NA	NA	NA
13	2	4	0.127	0.139	0.0111	3780	17.6
All RMA CMP-BSAs	5	24	0.127	0.259	NC	NC	NC
Control	1	5	0.148	0.148	NC	NC	NC
PEMA - deer mouse							
CMP-BSA 1	2	5	0.154	0.265	NC	NC	NC
2	0	5	BCRL	BCRL	NA	NA	NA
3	0	4	BCRL	BCRL	NA	NA	NA
4	0	4	BCRL	BCRL	NA	NA	NA
5	0	5	BCRL	BCRL	NA	NA	NA
11	0	3	BCRL	BCRL	NA	NA	NA
12	0	2	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	2	28	0.154	0.265	NC	NC	NC
Control	0	5	BCRL	BCRL	NA	NA	NA

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

**Sample analysis has been delayed pending completion of laboratory certification.

BCRL = Sites examined with DDT concentrations below lower certified reporting limit of 0.118 µg/g (MRI) or 0.132 µg/g (ESE) for animal tissue and 0.0753 µg/g (MRI) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

Table 4.1-4 DDT Statistical Results for Terrestrial Species on RMA in 1989

Page 3 of 3

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
PHCO - pheasant							
All Samples							
CMP-BSA 2	0	7	BCRL	BCRL	NA	NA	NA
3	0	4	BCRL	BCRL	NA	NA	NA
5	0	6	BCRL	BCRL	NA	NA	NA
11	0	6	BCRL	BCRL	NA	NA	NA
N	0	2	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	25	BCRL	BCRL	NA	NA	NA
Control	0	6	BCRL	BCRL	NA	NA	NA
Dressed carcass							
CMP-BSA 2	0	4	BCRL	BCRL	NA	NA	NA
3	0	2	BCRL	BCRL	NA	NA	NA
5	0	3	BCRL	BCRL	NA	NA	NA
11	0	3	BCRL	BCRL	NA	NA	NA
N	0	1	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	13	BCRL	BCRL	NA	NA	NA
Control	0	3	BCRL	BCRL	NA	NA	NA
Liver							
CMP-BSA 2	0	3	BCRL	BCRL	NA	NA	NA
3	0	2	BCRL	BCRL	NA	NA	NA
5	0	3	BCRL	BCRL	NA	NA	NA
11	0	3	BCRL	BCRL	NA	NA	NA
N	0	1	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	12	BCRL	BCRL	NA	NA	NA
Control	0	3	BCRL	BCRL	NA	NA	NA
STNB - western meadowlark							
CMP-BSA 2	0	5	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	5	BCRL	BCRL	NA	NA	NA
ZEMA - mourning dove							
CMP-BSA 1	0	6	BCRL	BCRL	NA	NA	NA
2	0	8	BCRL	BCRL	NA	NA	NA
3	0	6	BCRL	BCRL	NA	NA	NA
4	0	11	BCRL	BCRL	NA	NA	NA
5	0	5	BCRL	BCRL	NA	NA	NA
12	0	2	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	38	BCRL	BCRL	NA	NA	NA
Control	0	5	BCRL	BCRL	NA	NA	NA

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

**Sample analysis has been delayed pending completion of laboratory certification.

BCRL = Sites examined with DDT concentrations below lower certified reporting limit of 0.118 µg/g (MRI) or 0.132 µg/g (ESE) for animal tissue and 0.0753 µg/g (MRI) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

Table 4.1-5 DDE Statistical Results for Terrestrial Species on RMA in 1989

Page 1 of 3

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
ACRI - grasshopper							
CMP-BSA 1	0	5	BCRL	BCRL	NA	NA	NA
2	0	5	BCRL	BCRL	NA	NA	NA
3	0	4	BCRL	BCRL	NA	NA	NA
4	0	4	BCRL	BCRL	NA	NA	NA
5	0	3	BCRL	BCRL	NA	NA	NA
11	0	1	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	22	BCRL	BCRL	NA	NA	NA
Control	0	5	BCRL	BCRL	NA	NA	NA
ATCU - burrowing owl							
CMP-BSA 3	1	1	0.0764	0.0764	0.0764	1.00	1.06
N	0	1	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	1	2	0.0764	0.0764	0.00868	12900	21.7
Control		0	NA	NA	NA	NA	NA
BRTE - cheatgrass							
CMP-BSA 1	0	4	BCRL	BCRL	NA	NA	NA
2	0	5	BCRL	BCRL	NA	NA	NA
3	0	4	BCRL	BCRL	NA	NA	NA
4	0	3	BCRL	BCRL	NA	NA	NA
5	1	5	0.0692	0.0692	NC	NC	NC
11	0	3	BCRL	BCRL	NA	NA	NA
12	0	2	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	1	26	0.0692	0.0692	NC	NC	NC
Control	0	6	BCRL	BCRL	NA	NA	NA
COLE - ground beetle							
CMP-BSA 1	0	3	BCRL	BCRL	NA	NA	NA
2	0	3	BCRL	BCRL	NA	NA	NA
5	1	2	0.355	0.355	0.0187	33600000	64.2
All RMA CMP-BSAs	1	8	0.355	0.355	NC	NC	NC
Control	0	3	BCRL	BCRL	NA	NA	NA
CYLU - prairie dog							
CMP-BSA 1	0	10	BCRL	BCRL	NA	NA	NA
2	0	8	BCRL	BCRL	NA	NA	NA
3	0	10	BCRL	BCRL	NA	NA	NA
11	0	1	BCRL	BCRL	NA	NA	NA
12	0	3	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	32	BCRL	BCRL	NA	NA	NA
Control	0	10	BCRL	BCRL	NA	NA	NA
HEAN - sunflower							
CMP-BSA 1	**	4					
2	**	5					
3	**	4					
4	**	4					
5	**	4					
11	**	2					
All RMA CMP-BSAs	**	23					
Control	**	5					

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

**Sample analysis has been delayed pending completion of laboratory certification.

BCRL = Sites examined with DDE concentrations below lower certified reporting limit of 0.100 µg/g (MRI) or 0.063 µg/g (ESE) for animal tissue and 0.0416 µg/g (MRI) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.
means calculated using this GT value may be underestimated.

Table 4.1-5 DDE Statistical Results for Terrestrial Species on RMA in 1989

Page 2 of 3

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
KOIR - kochia							
CMP-BSA 1	0	3	BCRL	BCRL	NA	NA	NA
2	0	4	BCRL	BCRL	NA	NA	NA
3	0	2	BCRL	BCRL	NA	NA	NA
5	0	5	BCRL	BCRL	NA	NA	NA
11	0	1	BCRL	BCRL	NA	NA	NA
12	0	2	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	17	BCRL	BCRL	NA	NA	NA
Control	0	5	BCRL	BCRL	NA	NA	NA
LASE - prickly lettuce							
CMP-BSA 1	0	3	BCRL	BCRL	NA	NA	NA
2	0	1	BCRL	BCRL	NA	NA	NA
3	0	2	BCRL	BCRL	NA	NA	NA
4	0	2	BCRL	BCRL	NA	NA	NA
5	0	1	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	9	BCRL	BCRL	NA	NA	NA
Control	0	2	BCRL	BCRL	NA	NA	NA
OLIG - earthworm							
CMP-BSA 1	0	2	BCRL	BCRL	NA	NA	NA
2	1	3	0.169	0.169	NC	NC	NC
3	0	3	BCRL	BCRL	NA	NA	NA
4	1	3	0.675	0.675	NC	NC	NC
5	1	5	1.30	1.30	NC	NC	NC
11	0	2	BCRL	BCRL	NA	NA	NA
12	0	2	BCRL	BCRL	NA	NA	NA
13	3	4	0.432	0.608	0.116454	3960	17.8
All RMA CMP-BSAs	6	24	0.169	1.30	NC	NC	NC
Control	0	5	BCRL	BCRL	NA	NA	NA
PEMA - deer mouse							
CMP-BSA 1	0	5	BCRL	BCRL	NA	NA	NA
2	0	5	BCRL	BCRL	NA	NA	NA
3	0	4	BCRL	BCRL	NA	NA	NA
4	1	4	1.90	1.90	NC	NC	NC
5	0	5	BCRL	BCRL	NA	NA	NA
11	0	3	BCRL	BCRL	NA	NA	NA
12	0	2	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	1	28	1.90	1.90	NC	NC	NC
Control	0	5	BCRL	BCRL	NA	NA	NA

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

**Sample analysis has been delayed pending completion of laboratory certification.

BCRL = Sites examined with DDE concentrations below lower certified reporting limit of 0.100 µg/g (MRI) or 0.063 µg/g (ESE) for animal tissue and 0.0416 µg/g (MRI) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.
means calculated using this GT value may be underestimated.

Table 4.1-5 DDE Statistical Results for Terrestrial Species on RMA in 1989

Page 3 of 3

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
PHCO - pheasant							
All Samples							
CMP-BSA 2	0	7	BCRL	BCRL	NA	NA	NA
3	1	4	0.109	0.109	NC	NC	NA
5	2	6	0.0701	0.464	NC	NC	NA
11	0	6	BCRL	BCRL	NA	NA	NA
N	0	2	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	3	25	0.0701	0.464	NC	NA	NA
Control	0	6	BCRL	BCRL	NA	NA	NA
Dressed carcass							
CMP-BSA 2	0	4	BCRL	BCRL	NA	NA	NA
3	0	2	BCRL	BCRL	NA	NA	NA
5	1	3	0.0701	0.0701	NC	NC	NC
11	0	3	BCRL	BCRL	NA	NA	NA
N	0	1	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	1	13	0.0701	0.0701	NC	NC	NC
Control	0	3	BCRL	BCRL	NA	NA	NA
Liver							
CMP-BSA 2	0	3	BCRL	BCRL	NA	NA	NA
3	1	2	0.109	0.109	0.0104	64600	27.9
5	1	3	0.464	0.464	NC	NC	NC
11	0	3	BCRL	BCRL	NA	NA	NA
N	0	1	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	2	12	0.109	0.464	NC	NC	NC
Control	0	3	BCRL	BCRL	NA	NA	NA
STNE - western meadowlark							
CMP-BSA 2	0	5	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	5	BCRL	BCRL	NA	NA	NA
ZEMA - mourning dove							
CMP-BSA 1	0	6	BCRL	BCRL	NA	NA	NA
2	0	8	BCRL	BCRL	NA	NA	NA
3	0	6	BCRL	BCRL	NA	NA	NA
4	1	11	0.0766	0.0766	NC	NC	NC
5	0	5	BCRL	BCRL	NA	NA	NA
12	1	2	0.942	0.942	0.0305	1690000000	128
All RMA CMP-BSAs	2	38	0.0766	0.942	NC	NC	NC
Control	0	5	BCRL	BCRL	NA	NA	NA

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

**Sample analysis has been delayed pending completion of laboratory certification.

BCRL = Sites examined with DDE concentrations below lower certified reporting limit of 0.100 µg/g (MRI) or 0.063 µg/g (ESE) for animal tissue and 0.0416 µg/g (MRI) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated. means calculated using this GT value may be underestimated.

Table 4.1-6 Arsenic Statistical Results for Terrestrial Species on RMA in 1988

Page 1 of 3

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
ACRI - grasshopper							
CMP-BSA 1	0	5	BCRL	BCRL	NA	NA	NA
2	0	5	BCRL	BCRL	NA	NA	NA
3	0	4	BCRL	BCRL	NA	NA	NA
4	0	4	BCRL	BCRL	NA	NA	NA
5	0	3	BCRL	BCRL	NA	NA	NA
11	0	1	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	22	BCRL	BCRL	NA	NA	NA
Control	0	5	BCRL	BCRL	NA	NA	NA
ATCU - burrowing owl							
CMP-BSA 3	0	1	BCRL	BCRL	NA	NA	NA
N	0	1	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	2	BCRL	BCRL	NA	NA	NA
Control	0	0	NA	NA	NA	NA	NA
BRTE - cheatgrass							
CMP-BSA 1	0	4	BCRL	BCRL	NA	NA	NA
2	1	5	0.481	0.481	NC	NC	NC
3	0	4	BCRL	BCRL	NA	NA	NA
4	1	3	0.600	0.600	NC	NC	NC
5	0	5	BCRL	BCRL	NA	NA	NA
11	0	3	BCRL	BCRL	NA	NA	NA
12	2	2	0.965	1.11	1.03	1.01	1.10
All RMA CMP-BSAs	4	26	0.481	1.11	NC	NC	NC
Control	0	6	BCRL	BCRL	NA	NA	NA
COLE - ground beetle							
CMP-BSA 1	3	3	0.623	1.87	1.01	1.37	1.75
2	2	3	1.14	1.35	0.577	5.83	3.77
5	1	2	0.468	0.468	0.242	2.39	2.54
All RMA CMP-BSAs	6	8	0.468	1.87	0.573134	2.91	2.81
Control	0	3	BCRL	BCRL	NA	NA	NA
CYLU - prairie dog							
CMP-BSA 1	3	10	0.430	0.581	NC	NC	NC
2	1	8	0.435	0.435	NC	NC	NC
3	1	10	0.517	0.517	NC	NC	NC
11	0	1	BCRL	BCRL	NA	NA	NA
12	0	3	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	5	32	0.430	0.581	NC	NC	NC
Control	2	10	0.502	0.517	NC	NC	NC
HEAN - sunflower							
CMP-BSA 1	1	4	2.26	2.26	NC	NC	NC
2	0	5	BCRL	BCRL	NA	NA	NA
3	0	4	BCRL	BCRL	NA	NA	NA
4	1	4	0.877	0.877	NC	NC	NC
5	0	4	BCRL	BCRL	NA	NA	NA
11	0	2	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	2	23	0.877	2.26	NC	NC	NC
Control	0	5	BCRL	BCRL	NA	NA	NA

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

BCRL = Sites examined with arsenic concentrations below lower certified reporting limit of 0.438 µg/g (MRI) or 0.25 µg/g (ESE) for animal tissue and 0.250 µg/g (MRI) or 0.25 µg/g (ESE) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

GT = Amount detected was above the upper certified range for this method (refer to certified methods for PMRMA); means calculated using this GT value may be underestimated.

Table 4.1-6 Arsenic Statistical Results for Terrestrial Species on RMA in 1988

Page 2 of 3

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
KOIR - kochia							
CMP-BSA 1	2	3	0.353	0.419	0.264423	1.53	1.92
2	0	4	BCRL	BCRL	NA	NA	NA
3	0	2	BCRL	BCRL	NA	NA	NA
5	0	5	BCRL	BCRL	NA	NA	NA
11	0	1	BCRL	BCRL	NA	NA	NA
12	1	2	0.334	0.334	0.204328	1.62	2.00
All RMA CMP-BSAs	3	17	0.334	0.419	NC	NC	NC
Control	0	5	BCRL	BCRL	NA	NA	NA
LASE - prickly lettuce							
CMP-BSA 1	0	3	BCRL	BCRL	NA	NA	NA
2	0	1	BCRL	BCRL	NA	NA	NA
3	0	2	BCRL	BCRL	NA	NA	NA
4	1	2	0.965	0.965	0.347311	8.07	4.24
5	0	1	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	1	9	0.965	0.965	NC	NC	NC
Control	0	3	BCRL	BCRL	NA	NA	NA
OLIG - earthworm							
CMP-BSA 1	2	2	1.06	1.89	1.42	1.18	1.50
2	3	3	1.52	1.79	1.64	1.01	1.08
3	3	3	0.708	1.38	1.00	1.12	1.40
4	3	3	0.682	3.45	1.33	2.05	2.34
5	5	5	0.621	1.40	0.951	1.09	1.35
11	2	2	1.63	2.05	1.83	1.03	1.18
12	2	2	GT5.00	GT5.00	GT5.00	1.00	1.00
13	4	4	1.21	2.19	1.48	1.07	1.30
All RMA CMP-BSAs	24	24	0.621	GT5.00	1.44	1.35	1.73
Control	4	5	0.636	0.949	0.630	1.45	1.84
PEMA - deer mouse							
CMP-BSA 1	1	5	1.06	1.06	NC	NC	NC
2	0	5	BCRL	BCRL	NA	NA	NA
3	0	4	BCRL	BCRL	NA	NA	NA
4	0	4	BCRL	BCRL	NA	NA	NA
5	0	5	BCRL	BCRL	NA	NA	NA
11	0	3	BCRL	BCRL	NA	NA	NA
12	1	2	1.16	1.16	0.504024	4.01	3.25
All RMA CMP-BSAs	2	28	1.06	1.16	NC	NC	NC
Control	0	5	BCRL	BCRL	NA	NA	NA

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

BCRL = Sites examined with arsenic concentrations below lower certified reporting limit of 0.438 µg/g (MRI) or 0.25 µg/g (ESE) for animal tissue and 0.250 µg/g (MRI) or 0.25 µg/g (ESE) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

GT = Amount detected was above the upper certified range for this method (refer to certified methods for PMRMA); means calculated using this GT value may be underestimated.

Table 4.1-6 Arsenic Statistical Results for Terrestrial Species on RMA in 1988

Page 3 of 3

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
PHCO - pheasant							
All Samples							
CMP-BSA 2	0	7	BCRL	BCRL	NA	NA	NA
3	0	4	BCRL	BCRL	NA	NA	NA
5	0	6	BCRL	BCRL	NA	NA	NA
11	0	6	BCRL	BCRL	NA	NA	NA
N	0	2	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	25	BCRL	BCRL	NA	NA	NA
Control	0	6	BCRL	BCRL	NA	NA	NA
Dressed carcass							
CMP-BSA 2	0	4	BCRL	BCRL	NA	NA	NA
3	0	2	BCRL	BCRL	NA	NA	NA
5	0	3	BCRL	BCRL	NA	NA	NA
11	0	3	BCRL	BCRL	NA	NA	NA
N	0	1	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	13	BCRL	BCRL	NA	NA	NA
Control	0	3	BCRL	BCRL	NA	NA	NA
Liver							
CMP-BSA 2	0	3	BCRL	BCRL	NA	NA	NA
3	0	2	BCRL	BCRL	NA	NA	NA
5	0	3	BCRL	BCRL	NA	NA	NA
11	0	3	BCRL	BCRL	NA	NA	NA
N	0	1	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	12	BCRL	BCRL	NA	NA	NA
Control	0	3	BCRL	BCRL	NA	NA	NA
STNE - western meadowlark							
CMP-BSA 2	0	5	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	5	BCRL	BCRL	NA	NA	NA
ZEMA - mourning dove							
CMP-BSA 1	0	6	BCRL	BCRL	NA	NA	NA
2	1	8	2.63	2.63	NC	NC	NC
3	0	6	BCRL	BCRL	NA	NA	NA
4	0	11	BCRL	BCRL	NA	NA	NA
5	0	5	BCRL	BCRL	NA	NA	NA
12	0	2	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	1	38	2.63	2.63	NC	NC	NC
Control	0	5	BCRL	BCRL	NA	NA	NA

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

BCRL = Sites examined with arsenic concentrations below lower certified reporting limit of 0.438 µg/g (MRI) or 0.25 µg/g (ESE) for animal tissue and 0.250 µg/g (MRI) or 0.25 µg/g (ESE) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

GT = Amount detected was above the upper certified range for this method (refer to certified methods for PMRMA); means calculated using this GT value may be underestimated.

Table 4.1-7 Mercury Statistical Results for Terrestrial Species on RMA in 1989

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
ACRI - grasshopper							
CMP-BSA 1	0	5	BCRL	BCRL	NA	NA	NA
2	0	5	BCRL	BCRL	NA	NA	NA
3	0	4	BCRL	BCRL	NA	NA	NA
4	0	4	BCRL	BCRL	NA	NA	NA
5	0	3	BCRL	BCRL	NA	NA	NA
11	0	1	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	22	BCRL	BCRL	NA	NA	NA
Control	0	5	BCRL	BCRL	NA	NA	NA
ATCU - burrowing owl							
CMP-BSA 3	0	1	BCRL	BCRL	NA	NA	NA
N	0	1	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	2	BCRL	BCRL	NA	NA	NA
Control		0	NA	NA	NA	NA	NA
BRTE - cheatgrass							
CMP-BSA 1	0	4	BCRL	BCRL	NA	NA	NA
2	0	5	BCRL	BCRL	NA	NA	NA
3	0	4	BCRL	BCRL	NA	NA	NA
4	0	3	BCRL	BCRL	NA	NA	NA
5	0	5	BCRL	BCRL	NA	NA	NA
11	0	3	BCRL	BCRL	NA	NA	NA
12	0	2	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	26	BCRL	BCRL	NA	NA	NA
Control	0	6	BCRL	BCRL	NA	NA	NA
COLE - ground beetle							
CMP-BSA 1	0	3	BCRL	BCRL	NA	NA	NA
2	0	3	BCRL	BCRL	NA	NA	NA
5	0	2	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	8	BCRL	BCRL	NA	NA	NA
Control	0	3	BCRL	BCRL	NA	NA	NA
CYLU - prairie dog							
CMP-BSA 1	0	10	BCRL	BCRL	NA	NA	NA
2	0	8	BCRL	BCRL	NA	NA	NA
3	1	10	0.0472	0.0472	NC	NC	NC
11	0	1	BCRL	BCRL	NA	NA	NA
12	0	3	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	1	32	0.0472	0.0472	NC	NC	NC
Control	0	10	BCRL	BCRL	NA	NA	NA
HEAN - sunflower							
CMP-BSA 1	0	4	BCRL	BCRL	NA	NA	NA
2	0	5	BCRL	BCRL	NA	NA	NA
3	0	4	BCRL	BCRL	NA	NA	NA
4	0	4	BCRL	BCRL	NA	NA	NA
5	0	4	BCRL	BCRL	NA	NA	NA
11	0	2	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	23	BCRL	BCRL	NA	NA	NA
Control	0	5	BCRL	BCRL	NA	NA	NA

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

BCRL = Sites examined with mercury concentrations below lower certified reporting limit of 0.0463 µg/g (MRI) or 0.05 µg/g (ESE) for animal tissue and 0.0574 µg/g (MRI) or 0.05 µg/g (ESE) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

Table 4.1-7 Mercury Statistical Results for Terrestrial Species on RMA in 1989

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
KOIR - kochia							
CMP-BSA 1	0	3	BCRL	BCRL	NA	NA	NA
2	0	4	BCRL	BCRL	NA	NA	NA
3	0	2	BCRL	BCRL	NA	NA	NA
5	0	5	BCRL	BCRL	NA	NA	NA
11	0	1	BCRL	BCRL	NA	NA	NA
12	0	2	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	17	BCRL	BCRL	NA	NA	NA
Control	0	5	BCRL	BCRL	NA	NA	NA
LASE - prickly lettuce							
CMP-BSA 1	0	3	BCRL	BCRL	NA	NA	NA
2	0	1	BCRL	BCRL	NA	NA	NA
3	0	2	BCRL	BCRL	NA	NA	NA
4	0	2	BCRL	BCRL	NA	NA	NA
5	0	1	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	9	BCRL	BCRL	NA	NA	NA
Control	0	3	BCRL	BCRL	NA	NA	NA
OLIG - earthworm							
CMP-BSA 1	2	2	0.114	0.141	0.127	1.02	1.16
2	3	3	0.0591	0.0935	0.0723	1.06	1.26
3	2	3	0.0474	0.0661	0.0331	2.35	2.52
4	2	3	0.0666	0.132	0.0467	4.83	3.51
5	3	5	0.0694	0.0821	0.0351	2.81	2.76
11	0	2	BCRL	BCRL	NA	NA	NA
12	2	2	0.0596	0.115	0.0828	1.24	1.59
13	3	4	0.0581	0.0971	0.0481	2.58	2.65
All RMA CMP-BSAs	17	24	0.0474	0.141	0.0454	2.39	2.54
Control	1	5	0.0561	0.0561	NC	NC	NC
PEMA - deer mouse							
CMP-BSA 1	1	5	0.807	0.807	NC	NC	NC
2	1	5	0.0579	0.0579	NC	NC	NC
3	0	4	BCRL	BCRL	NA	NA	NA
4	0	4	BCRL	BCRL	NA	NA	NA
5	0	5	BCRL	BCRL	NA	NA	NA
11	0	3	BCRL	BCRL	NA	NA	NA
12	1	2	0.338	0.338	0.0625	297	10.9
All RMA CMP-BSAs	3	28	0.0579	0.807	NC	NC	NC
Control	1	5	0.0563	0.0563	NC	NC	NC

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

BCRL = Sites examined with mercury concentrations below lower certified reporting limit of 0.0463 µg/g (MRI) or 0.05 µg/g (ESE) for animal tissue and 0.0574 µg/g (MRI) or 0.05 µg/g (ESE) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

Table 4.1-7 Mercury Statistical Results for Terrestrial Species on RMA in 1989

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
PHCO - pheasant							
All Samples							
CMP-BSA 2	0	5	BCRL	BCRL	NA	NA	NA
3	0	4	BCRL	BCRL	NA	NA	NA
5	0	5	BCRL	BCRL	NA	NA	NA
11	0	3	BCRL	BCRL	NA	NA	NA
N	0	1	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	18	BCRL	BCRL	NA	NA	NA
Control	0	4	BCRL	BCRL	NA	NA	NA
Dressed carcass							
CMP-BSA 2	0	4	BCRL	BCRL	NA	NA	NA
3	0	2	BCRL	BCRL	NA	NA	NA
5	0	3	BCRL	BCRL	NA	NA	NA
11	0	3	BCRL	BCRL	NA	NA	NA
N	0	1	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	13	BCRL	BCRL	NA	NA	NA
Control	0	3	BCRL	BCRL	NA	NA	NA
Liver							
CMP-BSA 2	0	1	BCRL	BCRL	NA	NA	NA
3	0	2	BCRL	BCRL	NA	NA	NA
5	0	2	BCRL	BCRL	NA	NA	NA
11	0	0	NA	NA	NA	NA	NA
N	0	0	NA	NA	NA	NA	NA
All RMA CMP-BSAs	0	5	BCRL	BCRL	NA	NA	NA
Control	0	1	BCRL	BCRL	NA	NA	NA
STNE - western meadowlark							
CMP-BSA 2	0	5	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	5	BCRL	BCRL	NA	NA	NA
ZEMA - mourning dove							
CMP-BSA 1	0	6	BCRL	BCRL	NA	NA	NA
2	0	8	BCRL	BCRL	NA	NA	NA
3	0	6	BCRL	BCRL	NA	NA	NA
4	0	11	BCRL	BCRL	NA	NA	NA
5	0	5	BCRL	BCRL	NA	NA	NA
12	0	2	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	38	BCRL	BCRL	NA	NA	NA
Control	0	5	BCRL	BCRL	NA	NA	NA

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

BCRL = Sites examined with mercury concentrations below lower certified reporting limit of 0.0463 µg/g (MRI) or 0.05 µg/g (ESE) for animal tissue and 0.0574 µg/g (MRI) or 0.05 µg/g (ESE) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

Table 4.1-8 Summary of Detection Frequencies Among Terrestrial Trophic Groups and Species Collected in CMP-BSAs

Trophic Group: Species Code:	Primary Producers			Herbivores		
	BRTE	HEAN	KOIR	LASE	Σ	%
Analyte						
Aldrin	1/26	*	1/17	0/9	2/52	3.8
Dieldrin	11/25	*	1/17	4/9	16/51	31
Endrin	1/26	*	0/17	0/9	1/52	1.9
DDT	2/26	*	1/17	0/9	3/52	5.8
DDE	1/26	*	0/17	0/9	1/52	1.9
Arsenic	4/26	2/23	3/17	1/9	10/75	13
Mercury	0/26	0/23	0/17	0/9	0/75	0
Σ	20/181	2/46	6/119	5/63	33/409	
%	11	4.3	5.0	7.9	8.1	
Trophic Group: Species Code:	Omnivores			Carnivores		
	COLE	PEMA	PHCO	STNE	Σ	%
Analyte						
Aldrin	3/8	3/28	0/25	0/5	6/66	9.1
Dieldrin	8/8	19/25	16/25	5/5	48/63	76
Endrin	4/8	1/28	0/25	0/5	5/66	7.6
DDT	0/8	2/28	0/25	0/5	2/66	3.0
DDE	1/8	1/28	3/25	0/5	5/66	7.6
Arsenic	6/8	2/28	0/25	0/5	8/66	12
Mercury	0/8	3/28	0/18	0/5	3/52	5.1
Σ	22/56	31/193	19/168	5/35	77/452	
%	39	16	11	14	17	
Trophic Group: Species Code:	Detritivores			Species Codes		
	OLIG	%	ATCU	%	ACRI	CYLU
Analyte						
Aldrin	0/22		0/2		0/32	1/92
Dieldrin	10/22		2/2		27/31	63/91
Endrin	3/22		0/2		0/32	14/92
DDT	3/22		0/2		1/32	4/92
DDE	0/22		1/2		0/32	2/92
Arsenic	0/22		0/2		5/32	6/92
Mercury	0/22		0/2		1/32	1/92
Σ	16/154		3/4		34/223	91/643
%	10		21		15	14

*Not Analyzed

Table 4.1-9 Aldrin Statistical Results for Terrestrial Trophic Level Combinations on RMA in 1989

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
TCAR - carnivore							
CMP-BSA 3	0	1	BCRL	BCRL	NA	NA	NA
N	0	1	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	2	BCRL	BCRL	NA	NA	NA
Control		0	NA	NA	NA	NA	NA
TDET - detritivore							
CMP-BSA 1	0	2	BCRL	BCRL	NA	NA	NA
2	0	3	BCRL	BCRL	NA	NA	NA
3	0	3	BCRL	BCRL	NA	NA	NA
4	1	3	0.447	0.447	NC	NC	NC
5	0	5	BCRL	BCRL	NA	NA	NA
11	0	2	BCRL	BCRL	NA	NA	NA
12	0	2	BCRL	BCRL	NA	NA	NA
13	0	4	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	1	24	0.447	0.447	NC	NC	NC
Control	0	5	BCRL	BCRL	NA	NA	NA
THER - herbivore							
CMP-BSA 1	0	21	BCRL	BCRL	NA	NA	NA
2	1	21	0.0227	0.0227	NC	NC	NC
3	0	20	BCRL	BCRL	NA	NA	NA
4	0	15	BCRL	BCRL	NA	NA	NA
5	0	8	BCRL	BCRL	NA	NA	NA
11	0	2	BCRL	BCRL	NA	NA	NA
12	0	5	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	1	92	0.0227	0.0227	NC	NC	NC
Control	0	20	BCRL	BCRL	NA	NA	NA
TOMN - omnivore							
CMP-BSA 1	1	8	0.0368	0.0368	NC	NC	NC
2	2	20	0.0160	0.0569	NC	NC	NC
3	2	8	0.167	0.337	NC	NC	NC
4	1	4	2.20	2.20	NC	NC	NC
5	0	13	BCRL	BCRL	NA	NA	NA
11	0	9	BCRL	BCRL	NA	NA	NA
12	0	2	BCRL	BCRL	NA	NA	NA
N	0	2	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	6	66	0.0160	2.20	NC	NC	NC
Control	0	14	BCRL	BCRL	NA	NA	NA
TPPR - primary producer							
CMP-BSA 1	1	10	0.0970	0.0970	NC	NC	NC
2	0	10	BCRL	BCRL	NA	NA	NA
3	0	8	BCRL	BCRL	NA	NA	NA
4	0	5	BCRL	BCRL	NA	NA	NA
5	0	11	BCRL	BCRL	NA	NA	NA
11	0	4	BCRL	BCRL	NA	NA	NA
12	1	4	0.254	0.254	NC	NC	NC
All RMA CMP-BSAs	2	52	0.0970	0.254	NC	NC	NC
Control	0	13	BCRL	BCRL	NA	NA	NA

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

BCRL = Sites examined with aldrin concentrations below lower certified reporting limit of 0.103 µg/g (MRI) or 0.013 µg/g (ESE) for animal tissue and 0.0663 µg/g (MRI) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

Table 4.1-10 Dieldrin Statistical Results for Terrestrial Trophic Level Combinations on RMA in 1989

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
TCAR - carnivore							
CMP-BSA 3	0	1	BCRL	BCRL	NA	NA	NA
N	0	1	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	2	BCRL	BCRL	NA	NA	NA
Control		0	NA	NA	NA	NA	NA
TDET - detritivore							
CMP-BSA 1	2	2	0.328	0.682	0.473	1.31	1.68
2	3	3	0.188	3.60	0.933	9.27	4.45
3	2	3	0.104	0.275	0.0532	70.5	7.87
4	3	3	0.175	2.00	0.639	4.49	3.40
5	4	5	0.337	2.70	0.258	235.	10.3
11	2	2	0.0876	0.111	0.986	1.03	1.18
12	2	2	0.539	0.655	0.594	1.02	1.15
13	1	4	0.161	0.161	NC	NC	NC
All RMA CMP-BSAs	19	24	0.0876	3.60	0.176	74.3	7.97
Control	0	5	BCRL	BCRL	NA	NA	NA
THER - herbivore							
CMP-BSA 1	16	21	0.0334	8.00	0.0703	107	8.68
2	16	20	0.0200	3.81	0.120	178	9.74
3	16	20	0.0235	2.00	0.0811	148	9.36
4	9	15	0.0750	1.71	0.0513	6190	19.2
5	1	8	0.0243	0.0243	NC	NC	NC
11	0	2	BCRL	BCRL	NA	NA	NA
12	5	5	0.0296	1.52	0.101	13.3	4.99
All RMA CMP-BSAs	63	91	0.020	8.00	0.0556	388	11.5
Control	0	15	BCRL	BCRL	NA	NA	NA
TOMN - omnivore							
CMP-BSA 1	6	6	0.132	11.0	1.37	23.3	5.90
2	19	19	0.0370	2.19	0.384	5.82	3.77
3	8	8	0.0544	9.10	0.809	30.1	6.33
4	4	4	4.90	35.0	10.4	2.05	2.33
5	9	13	0.127	5.95	0.128	9650	20.7
11	0	9	BCRL	BCRL	NA	NA	NA
12	1	2	0.113	0.113	0.0244	111.	8.76
N	1	2	0.0453	0.0453	0.00714	924.	13.6
All RMA CMP-BSAs	48	63	0.0370	35.0	0.177	5797	19.0
Control	2	14	0.0343	0.0368	NC	NC	NC
TPPR - primary producer							
CMP-BSA 1	5	10	0.0633	0.223	0.0199	26.9	6.14
2	2	10	0.0642	0.0688	NC	NC	NC
3	4	7	0.0867	0.336	0.0300	55.3	7.41
4	3	5	0.0716	0.156	0.0257	25.6	6.05
5	2	11	0.145	0.145	NC	NC	NC
11	0	4	BCRL	BCRL	NA	NA	NA
12	0	4	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	16	51	0.0633	0.336	NC	NC	NC
Control	0	13	BCRL	BCRL	NA	NA	NA

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

**Sample analysis has been delayed pending completion of laboratory certification.

BCRL = Sites examined with dieldrin concentrations below lower certified reporting limit of 0.0840 µg/g (MRI) or 0.018 µg/g (ESE) for animal tissue and 0.0592 µg/g (MRI) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

Table 4.1-11 Endrin Statistical Results for Terrestrial Trophic Level Combinations on RMA in 1989

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
TCAR - carnivore							
CMP-BSA 3	0	1	BCRL	BCRL	NA	NA	NA
N	0	1	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	2	BCRL	BCRL	NA	NA	NA
Control		0	NA	NA	NA	NA	NA
TDET - detritivore							
CMP-BSA 1	0	2	BCRL	BCRL	NA	NA	NA
2	1	2	0.561	0.561	0.0360	3530000	48.6
3	0	3	BCRL	BCRL	NA	NA	NA
4	0	3	BCRL	BCRL	NA	NA	NA
5	0	4	BCRL	BCRL	NA	NA	NA
11	0	2	BCRL	BCRL	NA	NA	NA
12		0	NC	NC	NC	NC	NC
13	0	4	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	1	20	0.561	0.561	NC	NC	NC
Control	0	5	BCRL	BCRL	NA	NA	NA
THER - herbivore							
CMP-BSA 1	2	21	0.155	0.218	NC	NC	NC
2	6	21	0.0732	0.338	NC	NC	NC
3	2	20	0.0529	0.102	NC	NC	NC
4	2	15	0.233	0.253	NC	NC	NC
5	1	8	0.981	0.981	NC	NC	NC
11	0	2	BCRL	BCRL	NA	NA	NA
12	1	5	0.0779	0.0779	NC	NC	NC
All RMA CMP-BSAs	14	92	0.0529	0.981	NC	NC	NC
Control	0	20	BCRL	BCRL	NA	NA	NA
TOMN - omnivore							
CMP-BSA 1	2	8	0.0934	0.237	NC	NC	NC
2	3	20	0.0646	0.0975	NC	NC	NC
3	0	8	BCRL	BCRL	NA	NA	NA
4	0	4	BCRL	BCRL	NA	NA	NA
5	0	13	BCRL	BCRL	NA	NA	NA
11	0	9	BCRL	BCRL	NA	NA	NA
12	0	2	BCRL	BCRL	NA	NA	NA
N	0	2	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	5	66	0.0646	0.237	NC	NC	NC
Control	0	14	BCRL	BCRL	NA	NA	NA
TPPR - primary producer							
CMP-BSA 1	0	10	BCRL	BCRL	NA	NA	NA
2	0	10	BCRL	BCRL	NA	NA	NA
3	0	8	BCRL	BCRL	NA	NA	NA
4	0	5	BCRL	BCRL	NA	NA	NA
5	1	11	0.0963	0.0963	NC	NC	NC
11	0	4	BCRL	BCRL	NA	NA	NA
12	0	4	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	1	52	0.0963	0.0963	NC	NC	NC
Control	0	13	BCRL	BCRL	NA	NA	NA

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

**Sample analysis has been delayed pending completion of laboratory certification.

BCRL = Sites examined with endrin concentrations below lower certified reporting limit of 0.0740 µg/g (MRI) or 0.006 µg/g (ESE) for animal tissue and 0.0465 µg/g (MRI) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

Table 4.1-12 DDT Statistical Results for Terrestrial Trophic Level Combinations on RMA in 1989

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
TCAR - carnivore							
CMP-BSA 3	0	1	BCRL	BCRL	NA	NA	NA
N	0	1	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	2	BCRL	BCRL	NA	NA	NA
Control		0	NA	NA	NA	NA	NA
TDET - detritivore							
CMP-BSA 1	1	2	0.259	0.259	0.0155	7990000	53.9
2	0	3	BCRL	BCRL	NA	NA	NA
3	0	3	BCRL	BCRL	NA	NA	NA
4	0	3	BCRL	BCRL	NA	NA	NA
5	2	5	0.155	0.177	NC	NC	NC
11	0	2	BCRL	BCRL	NA	NA	NA
12	0	2	BCRL	BCRL	NA	NA	NA
13	2	4	0.127	0.139	0.0111	3780	17.6
All RMA CMP-BSAs	5	24	0.127	0.259	NC	NC	NC
Control	1	5	0.148	0.148	NC	NC	NC
THER - herbivore							
CMP-BSA 1	0	21	BCRL	BCRL	NA	NA	NA
2	1	21	0.143	0.143	NC	NC	NC
3	1	20	0.159	0.159	NC	NC	NC
4	1	15	0.182	0.182	NC	NC	NC
5	0	8	BCRL	BCRL	NA	NA	NA
11	1	2	0.134	0.134	0.0118	139000	31.2
12	0	5	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	4	92	0.134	0.182	NC	NC	NC
Control	0	20	BCRL	BCRL	NA	NA	NA
TOMN - omnivore							
CMP-BSA 1	2	8	0.154	0.265	NC	NC	NC
2	0	20	BCRL	BCRL	NA	NA	NA
3	0	8	BCRL	BCRL	NA	NA	NA
4	0	4	BCRL	BCRL	NA	NA	NA
5	0	13	BCRL	BCRL	NA	NA	NA
11	0	9	BCRL	BCRL	NA	NA	NA
12	0	2	BCRL	BCRL	NA	NA	NA
N	0	2	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	2	66	0.154	0.265	NC	NC	NC
Control	0	14	BCRL	BCRL	NA	NA	NA
TPPR - primary producer							
CMP-BSA 1	0	10	BCRL	BCRL	NA	NA	NA
2	1	10	0.0908	0.0908	NC	NC	NC
3	0	8	BCRL	BCRL	NA	NA	NA
4	0	5	BCRL	BCRL	NA	NA	NA
5	1	11	0.117	0.117	NC	NC	NC
11	0	4	BCRL	BCRL	NA	NA	NA
12	1	4	0.118	0.118	NC	NC	NC
All RMA CMP-BSAs	3	52	0.0908	0.118	NC	NC	NC
Control	0	13	BCRL	BCRL	NA	NA	NA

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

BCRL = Sites examined with DDT concentrations below lower certified reporting limit of 0.118 µg/g (MRI) or 0.132 µg/g (ESE) for animal tissue and 0.0753 µg/g (MRI) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

Table 4.1-13 DDE Statistical Results for Terrestrial Trophic Level Combinations on RMA in 1989

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
TCAR - carnivore							
CMP-BSA 3	1	1	0.0764	0.0764	0.0764	1.00	1.00
N	0	1	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	1	2	0.0764	0.0764	0.00868	12900	21.7
Control		0	NA	NA	NA	NA	NA
TDET - detritivore							
CMP-BSA 1	0	2	BCRL	BCRL	NA	NA	NA
2	1	3	0.169	0.169	NC	NC	NC
3	0	3	BCRL	BCRL	NA	NA	NA
4	1	3	0.675	0.675	NC	NC	NC
5	1	5	1.30	1.30	NC	NC	NC
11	0	2	BCRL	BCRL	NA	NA	NA
12	0	2	BCRL	BCRL	NA	NA	NA
13	3	4	0.432	0.608	0.116	3950	17.8
All RMA CMP-BSAs	6	24	0.169	1.30	NC	NC	NC
Control	0	5	BCRL	BCRL	NA	NA	NA
THER - herbivore							
CMP-BSA 1	0	21	BCRL	BCRL	NA	NA	NA
2	0	21	BCRL	BCRL	NA	NA	NA
3	0	20	BCRL	BCRL	NA	NA	NA
4	1	15	0.0766	0.0766	NC	NC	NC
5	0	8	BCRL	BCRL	NA	NA	NA
11	0	2	BCRL	BCRL	NA	NA	NA
12	1	5	0.942	0.942	NC	NC	NC
All RMA CMP-BSAs	2	92	0.0766	0.942	NC	NC	NC
Control	0	20	BCRL	BCRL	NA	NA	NA
TOMN - omnivore							
CMP-BSA 1	0	8	BCRL	BCRL	NA	NA	NA
2	0	20	BCRL	BCRL	NA	NA	NA
3	1	8	0.109	0.109	NC	NC	NC
4	1	4	1.90	1.90	NC	NC	NC
5	3	13	0.0701	0.464	NC	NC	NC
11	0	9	BCRL	BCRL	NA	NA	NA
12	0	2	BCRL	BCRL	NA	NA	NA
N	0	2	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	5	66	0.0701	1.90	NC	NC	NC
Control	0	14	BCRL	BCRL	NA	NA	NA
TPPR - primary producer							
CMP-BSA 1	0	10	BCRL	BCRL	NA	NA	NA
2	0	10	BCRL	BCRL	NA	NA	NA
3	0	8	BCRL	BCRL	NA	NA	NA
4	0	5	BCRL	BCRL	NA	NA	NA
5	1	11	0.0692	0.0692	NC	NC	NC
11	0	4	BCRL	BCRL	NA	NA	NA
12	0	4	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	1	52	0.0692	0.0692	NC	NC	NC
Control	0	13	BCRL	BCRL	NA	NA	NA

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

BCRL = Sites examined with DDE concentrations below lower certified reporting limit of 0.100 µg/g (MRI) or 0.063 µg/g (ESE) for animal tissue and 0.0416 µg/g (MRI) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

Table 4.1-14 Arsenic Statistical Results for Terrestrial Trophic Level Combinations on RMA in 1989

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
TCAR - carnivore							
CMP-BSA 3	0	1	BCRL	BCRL	NA	NA	NA
N	0	1	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	2	BCRL	BCRL	NA	NA	NA
Control		0	NA	NA	NA	NA	NA
TDET - detritivore							
CMP-BSA 1	2	2	1.06	1.89	1.41	1.18	1.51
2	3	3	1.52	1.79	1.64	1.01	1.08
3	3	3	0.708	1.38	1.01	1.12	1.40
4	3	3	0.682	3.45	1.33	2.05	2.33
5	5	5	0.621	1.40	0.951	1.09	1.35
11	2	2	1.63	2.05	1.83	1.03	1.18
12	2	2	GT5.00	GT5.00	GT5.00	1.00	1.00
13	4	4	1.21	2.19	1.48	1.07	1.30
All RMA CMP-BSAs	24	24	0.621	GT5.00	1.44	1.35	1.73
Control	4	5	0.636	0.949	0.630	1.45	1.84
THER - herbivore							
CMP-BSA 1	3	21	0.430	0.581	NC	NC	NC
2	2	21	0.435	2.63	NC	NC	NC
3	1	20	0.517	0.517	NC	NC	NC
4	0	15	BCRL	BCRL	NA	NA	NA
5	0	8	BCRL	BCRL	NA	NA	NA
11	0	2	BCRL	BCRL	NA	NA	NA
12	0	5	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	6	92	0.430	2.63	NC	NC	NC
Control	2	20	0.502	0.517	NC	NC	NC
TOMN - omnivore							
CMP-BSA 1	4	8	0.623	1.87	0.473	2.16	2.40
2	2	20	1.14	1.35	NC	NC	NC
3	0	8	BCRL	BCRL	NA	NA	NA
4	0	4	BCRL	BCRL	NA	NA	NA
5	1	13	0.468	0.468	NC	NC	NC
11	0	9	BCRL	BCRL	NA	NA	NA
12	1	2	1.16	1.16	0.504	4.01	3.25
N	0	2	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	8	66	0.468	1.87	NC	NC	NC
Control	0	14	BCRL	BCRL	NA	NA	NA
TPPR - primary producer							
CMP-BSA 1	3	14	0.353	2.26	NC	NC	NC
2	1	15	0.481	0.481	NC	NC	NC
3	0	12	BCRL	BCRL	NA	NA	NA
4	3	9	0.600	0.965	NC	NC	NC
5	0	15	BCRL	BCRL	NA	NA	NA
11	0	6	BCRL	BCRL	NA	NA	NA
12	3	4	0.334	1.11	0.460	2.83	2.77
All RMA CMP-BSAs	10	75	0.334	2.26	NC	NC	NC
Control	0	19	BCRL	BCRL	NA	NA	NA

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

BCRL = Sites examined with arsenic concentrations below lower certified reporting limit of 0.438 µg/g (MRI) or 0.25 µg/g (ESE) for animal tissue and 0.250 µg/g (MRI) or 0.25 µg/g (ESE) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

GT = Amount detected was above the upper certified range for this method (refer to certified methods for PMRMA); means calculated using this GT value may be underestimated.

Table 4.1-15 Mercury Statistical Results for Terrestrial Trophic Level Combinations on RMA in 1989

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
TCAR - carnivore							
CMP-BSA 3	0	1	BCRL	BCRL	NA	NA	NA
N	0	1	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	2	BCRL	BCRL	NA	NA	NA
Control		0	NA	NA	NA	NA	NA
TDET - detritivore							
CMP-BSA 1	2	2	0.114	0.141	0.127	1.02	1.16
2	3	3	0.0591	0.0935	0.0723	1.06	1.26
3	2	3	0.0474	0.0661	0.0331	2.35	2.52
4	2	3	0.0666	0.132	0.0467	4.83	3.51
5	3	5	0.0694	0.0821	0.0351	2.81	2.76
11	0	2	BCRL	BCRL	NA	NA	NA
12	2	2	0.0596	0.115	0.0828	1.24	1.59
13	3	4	0.0581	0.0971	0.0481	2.58	2.65
All RMA CMP-BSAs	17	24	0.0474	0.141	0.0454	2.39	2.54
Control	1	5	0.0561	0.0561	NC	NC	NC
THER - herbivore							
CMP-BSA 1	0	21	BCRL	BCRL	NA	NA	NA
2	0	21	BCRL	BCRL	NA	NA	NA
3	1	20	0.0472	0.0472	NC	NC	NC
4	0	15	BCRL	BCRL	NA	NA	NA
5	0	8	BCRL	BCRL	NA	NA	NA
11	0	2	BCRL	BCRL	NA	NA	NA
12	0	5	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	1	92	0.0472	0.0472	NC	NC	NC
Control	0	20	BCRL	BCRL	NA	NA	NA
TOMN - omnivore							
CMP-BSA 1	1	8	0.807	0.807	NC	NC	NC
2	1	18	0.0579	0.0579	NC	NC	NC
3	0	8	BCRL	BCRL	NA	NA	NA
4	0	4	BCRL	BCRL	NA	NA	NA
5	0	12	BCRL	BCRL	NA	NA	NA
11	0	6	BCRL	BCRL	NA	NA	NA
12	1	2	0.338	0.338	0.0625	297	10.9
N	0	1	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	3	59	0.0579	0.807	NC	NC	NC
Control	1	12	0.0563	0.0563	NC	NC	NC
TPPR - primary producer							
CMP-BSA 1	0	14	BCRL	BCRL	NA	NA	NA
2	0	15	BCRL	BCRL	NA	NA	NA
3	0	12	BCRL	BCRL	NA	NA	NA
4	0	9	BCRL	BCRL	NA	NA	NA
5	0	15	BCRL	BCRL	NA	NA	NA
11	0	6	BCRL	BCRL	NA	NA	NA
12	0	4	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	75	BCRL	BCRL	NA	NA	NA
Control	0	19	BCRL	BCRL	NA	NA	NA

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

BCRL = Sites examined with mercury concentrations below lower certified reporting limit of 0.0463 µg/g (MRI) or 0.05 µg/g (ESE) for animal tissue and 0.0574 µg/g (MRI) or 0.05 µg/g (ESE) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

Table 4.2-1 Aldrin Statistical Results for Aquatic Species on RMA in 1989

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
ANDI - blue-winged teal							
CMP-BSA 10	0	4	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	4	BCRL	BCRL	NA	NA	NA
Control		0	NA	NA	NA	NA	NA
ANPL - mallard							
CMP-BSA 10	1	3	0.0934	0.0934	NC	NC	NC
All RMA CMP-BSAs	1	3	0.0934	0.0934	NC	NC	NC
Control	0	7	BCRL	BCRL	NA	NA	NA
CEDE - coontail							
CMP-BSA 6	**	3					
7	**	3					
All RMA CMP-BSAs	**	6					
Control		0	NA	NA	NA	NA	NA
CHVO - killdeer							
CMP-BSA 6	0	3	BCRL	BCRL	NA	NA	NA
7	0	2	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	5	BCRL	BCRL	NA	NA	NA
Control		0	NA	NA	NA	NA	NA
ESLU - pike							
All RMA CMP-BSAs		0	NA	NA	NA	NA	NA
Control	0	3	BCRL	BCRL	NA	NA	NA
FUAM - coot							
CMP-BSA 6	0	2	BCRL	BCRL	NA	NA	NA
7	0	4	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	6	BCRL	BCRL	NA	NA	NA
Control	0	5	BCRL	BCRL	NA	NA	NA
ICNE and ICME - bullhead							
CMP-BSA 6	0	1	BCRL	BCRL	NA	NA	NA
8	0	5	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	6	BCRL	BCRL	NA	NA	NA
Control	0	6	BCRL	BCRL	NA	NA	NA
ICPU - catfish							
CMP-BSA 6	0	2	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	2	BCRL	BCRL	NA	NA	NA
Control	0	5	BCRL	BCRL	NA	NA	NA
LEMA - bluegill							
CMP-BSA 6	0	5	BCRL	BCRL	NA	NA	NA
7	0	5	BCRL	BCRL	NA	NA	NA
8	0	5	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	15	BCRL	BCRL	NA	NA	NA
Control	0	5	BCRL	BCRL	NA	NA	NA

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

**Sample analysis has been delayed pending completion of laboratory certification.

BCRL = Sites examined with aldrin concentrations below lower certified reporting limit of 0.103 µg/g (MRI) or 0.013 µg/g (ESE) for animal tissue and 0.0663 µg/g (MRI) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

Table 4.2-1 Aldrin Statistical Results for Aquatic Species on RMA in 1989

Page 2 of 2

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
MISA - bass							
CMP-BSA 6	0	5	BCRL	BCRL	NA	NA	NA
7	0	5	BCRL	BCRL	NA	NA	NA
8	0	5	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	15	BCRL	BCRL	NA	NA	NA
Control	0	5	BCRL	BCRL	NA	NA	NA
PLAN - plankton							
CMP-BSA 6	**	5					
7	**	5					
8	**	5					
All RMA CMP-BSAs	**	15					
Control	**	5					
POND - american pondweed							
CMP-BSA 6	**	4					
7	**	4					
8	**	4					
All RMA CMP-BSAs	**	12					
Control	**	5					
POPE - sego pondweed							
CMP-BSA 6	**	3					
7	**	3					
8	**	3					
All RMA CMP-BSAs	**	9					
Control	**	5					

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

**Sample analysis has been delayed pending completion of laboratory certification.

BCRL = Sites examined with aldrin concentrations below lower certified reporting limit of 0.103 µg/g (MRI) or 0.013 µg/g (ESE) for animal tissue and 0.0663 µg/g (MRI) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

Table 4.2-2 Dieldrin Statistical Results for Aquatic Species on RMA in 1989

Page 1 of 2

	Total # of Hits	Total # of Samples	Minimum Detected Conc(µg/g)	Maximum Detected Conc(µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
ANDI - blue-winged teal							
CMP-BSA 10	4	4	0.204	0.571	0.349	1.24	1.59
All RMA CMP-BSAs	4	4	0.204	0.571	0.349	1.24	1.59
Control		0	NA	NA	NA	NA	NA
ANPL - mallard							
CMP-BSA 10	3	3	0.0697	3.81	0.374	74.5	7.97
All RMA CMP-BSAs	3	3	0.0697	3.81	0.374	74.5	7.97
Control	0	7	BCRL	BCRL	NA	NA	NA
CEDE - coontail							
CMP-BSA 6	**	3					
7	**	3					
All RMA CMP-BSAs	**	6					
Control		0	NA	NA	NA	NA	NA
CHVO - killdeer							
CMP-BSA 6	3	3	0.895	1.37	1.07	1.05	1.25
8	2	2	0.154	1.14	0.419	7.42	4.12
All RMA CMP-BSAs	5	5	0.154	1.37	0.734	2.20	2.43
Control		0	NA	NA	NA	NA	NA
ESLU - pike							
All RMA CMP-BSAs		0	NA	NA	NA	NA	NA
Control	0	3	BCRL	BCRL	NA	NA	NA
FUAM - coot							
CMP-BSA 6	2	2	0.0202	0.101	0.0452	3.65	3.12
7	4	4	0.106	0.176	0.130	1.05	1.25
All RMA CMP-BSAs	6	6	0.0202	0.176	0.0916	1.80	2.15
Control	0	5	BCRL	BCRL	NA	NA	NA
ICNE and ICME - bullhead							
CMP-BSA 6	1	1	0.155	0.155	0.155	1.00	1.00
8	2	5	0.0350	0.0402	NC	NC	NC
All RMA CMP-BSAs	3	6	0.0350	0.155	0.00823	152	9.40
Control	0	6	BCRL	BCRL	NA	NA	NA
ICPU - catfish							
CMP-BSA 6	2	2	0.0504	0.0910	0.0677	1.19	1.52
All RMA CMP-BSAs	2	2	0.0504	0.0910	0.0677	1.19	1.52
Control	0	5	BCRL	BCRL	NA	NA	NA
LEMA - bluegill							

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

**Sample analysis has been delayed pending completion of laboratory certification.

BCRL = Sites examined with dieldrin concentrations below lower certified reporting limit of 0.0840 µg/g (MRI) or 0.018 µg/g (ESE) for animal tissue and 0.0592 µg/g (MRI) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

Table 4.2-2 Dieldrin Statistical Results for Aquatic Species on RMA in 1989

Page 2 of 2

	Total # of Hits	Total # of Samples	Minimum Detected Conc(µg/g)	Maximum Detected Conc(µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
CMP-BSA 6	2	5	0.0194	0.0258	NC	NC	NC
7	5	5	0.0486	0.981	0.154	4.18	3.31
8	4	5	0.0348	0.990	0.0463	384	11.5
All RMA CMP-BSAs	11	15	0.0194	0.990	0.0298	235	10.3
Control	0	5	BCRL	BCRL	NA	NA	NA
MISA - bass							
CMP-BSA 6	4	5	0.0224	0.0537	0.0181	12.9	4.95
7	5	5	0.0616	0.533	0.161	2.04	2.33
8	5	5	0.0216	0.132	0.0588	1.54	1.93
All RMA CMP-BSAs	14	15	0.0216	0.533	0.0556	6.77	3.99
Control	0	5	BCRL	BCRL	NA	NA	NA
PLAN - plankton							
CMP-BSA 6	**	5					
7	**	5					
8	**	5					
All RMA CMP-BSAs	**	15					
Control	**	5					
POND - american pondweed							
CMP-BSA 6	**	4					
7	**	4					
8	**	4					
All RMA CMP-BSAs	**	12					
Control	**	5					
POPE - sego pondweed							
CMP-BSA 6	**	3					
7	**	3					
8	**	3					
All RMA CMP-BSAs	**	9					
Control	**	5					

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

**Sample analysis has been delayed pending completion of laboratory certification.

BCRL = Sites examined with dieldrin concentrations below lower certified reporting limit of 0.0840 µg/g (MRI) or 0.018 µg/g (ESE) for animal tissue and 0.0592 µg/g (MRI) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

Table 4.2-3 Endrin Statistical Results for Aquatic Species on RMA in 1989

Page 1 of 2

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
ANDI - blue-winged teal							
CMP-BSA 10	0	4	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	4	BCRL	BCRL	NA	NA	NA
Control		0	NA	NA	NA	NA	NA
ANPL - mallard							
CMP-BSA 10	1	3	0.104	0.104	NC	NC	NC
All RMA CMP-BSAs	1	3	0.104	0.104	NC	NC	NC
Control	0	7	BCRL	BCRL	NA	NA	NA
CEDE - coontail							
CMP-BSA 6	**	3					
7	**	3					
All RMA CMP-BSAs	**	6					
Control		0	NA	NA	NA	NA	NA
CHVO - killdeer							
CMP-BSA 6	3	3	0.0714	0.195	0.111	1.30	1.67
8	0	2	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	3	5	0.0714	0.195	0.0177	634	12.7
Control		0	NA	NA	NA	NA	NA
ESLU - pike							
All RMA CMP-BSAs		0	NA	NA	NA	NA	NA
Control	0	3	BCRL	BCRL	NA	NA	NA
FUAM - coot							
CMP-BSA 6	0	2	BCRL	BCRL	NA	NA	NA
7	0	4	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	6	BCRL	BCRL	NA	NA	NA
Control	0	5	BCRL	BCRL	NA	NA	NA
ICNE and ICME - bullhead							
CMP-BSA 6	0	1	BCRL	BCRL	NA	NA	NA
8	0	5	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	6	BCRL	BCRL	NA	NA	NA
Control	0	6	BCRL	BCRL	NA	NA	NA
ICPU - catfish							
CMP-BSA 6	0	2	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	2	BCRL	BCRL	NA	NA	NA
Control	0	5	BCRL	BCRL	NA	NA	NA

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

**Sample analysis has been delayed pending completion of laboratory certification.

BCRL = Sites examined with endrin concentrations below lower certified reporting limit of 0.0740 µg/g (MRI) or 0.036 µg/g (ESE) for animal tissue and 0.0465 µg/g (MRI) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

Table 4.2-3 Endrin Statistical Results for Aquatic Species on RMA in 1989

Page 2 of 2

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
LEMA - bluegill							
CMP-BSA 6	0	5	BCRL	BCRL	NA	NA	NA
7	0	5	BCRL	BCRL	NA	NA	NA
8	0	5	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	15	BCRL	BCRL	NA	NA	NA
Control	0	5	BCRL	BCRL	NA	NA	NA
MISA - bass							
CMP-BSA 6	0	5	BCRL	BCRL	NA	NA	NA
7	1	5	0.0478	0.0478	NC	NC	NC
8	0	5	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	1	15	0.0478	0.0478	NC	NC	NC
Control	0	5	BCRL	BCRL	NA	NA	NA
PLAN - plankton							
CMP-BSA 6	**	5					
7	**	5					
8	**	5					
All RMA CMP-BSAs	**	15					
Control	**	5					
POND - american pondweed							
CMP-BSA 6	**	4					
7	**	4					
8	**	4					
All RMA CMP-BSAs	**	12					
Control	**	5					
POPE - sego pondweed							
CMP-BSA 6	**	3					
7	**	3					
8	**	3					
All RMA CMP-BSAs	**	9					
Control	**	5					

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

**Sample analysis has been delayed pending completion of laboratory certification.

BCRL = Sites examined with endrin concentrations below lower certified reporting limit of 0.0740 µg/g (MRI) or 0.036 µg/g (ESE) for animal tissue and 0.0465 µg/g (MRI) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

Table 4.2-4 DDT Statistical Results for Aquatic Species on RMA in 1989

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
ANDI - blue-winged teal							
CMP-BSA 10	0	4	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	4	BCRL	BCRL	NA	NA	NA
Control		0	NA	NA	NA	NA	NA
ANPL - mallard							
CMP-BSA 10	0	3	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	3	BCRL	BCRL	NA	NA	NA
Control	0	7	BCRL	BCRL	NA	NA	NA
CEDE - coontail							
CMP-BSA 6	**	3					
7	**	3					
All RMA CMP-BSAs	**	6					
Control		0	NA	NA	NA	NA	NA
CHVO - killdeer							
CMP-BSA 6	2	3	0.955	1.22	0.106	10100000	55.8
8	0	2	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	2	5	0.955	1.22	NC	NC	NC
Control		0	NA	NA	NA	NA	NA
ESLU - pike							
All RMA CMP-BSAs		0	NA	NA	NA	NA	NA
Control	0	3	BCRL	BCRL	NA	NA	NA
FUAM - coot							
CMP-BSA 6	0	2	BCRL	BCRL	NA	NA	NA
7	0	4	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	6	BCRL	BCRL	NA	NA	NA
Control	0	5	BCRL	BCRL	NA	NA	NA
ICNE and ICMB - bullhead							
CMP-BSA 6	0	1	BCRL	BCRL	NA	NA	NA
5	0	5	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	6	BCRL	BCRL	NA	NA	NA
Control	0	6	BCRL	BCRL	NA	NA	NA
ICPU - catfish							
CMP-BSA 6	0	2	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	2	BCRL	BCRL	NA	NA	NA
Control	0	5	BCRL	BCRL	NA	NA	NA

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

**Sample analysis has been delayed pending completion of laboratory certification.

BCRL = Sites examined with DDT concentrations below lower certified reporting limit of 0.118 µg/g (MRI) or 0.132 µg/g (ESE) for animal tissue and 0.0753 µg/g (MRI) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

Table 4.2-4 DDT Statistical Results for Aquatic Species on RMA in 1989

Page 2 of 2

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
LEMA - bluegill							
CMP-BSA 6	0	5	BCRL	BCRL	NA	NA	NA
7	0	5	BCRL	BCRL	NA	NA	NA
8	0	5	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	15	BCRL	BCRL	NA	NA	NA
Control	0	5	BCRL	BCRL	NA	NA	NA
MISA - bass							
CMP-BSA 6	0	5	BCRL	BCRL	NA	NA	NA
7	0	5	BCRL	BCRL	NA	NA	NA
8	0	5	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	15	BCRL	BCRL	NA	NA	NA
Control	0	5	BCRL	BCRL	NA	NA	NA
PLAN - plankton							
CMP-BSA 6	**	5					
7	**	5					
8	**	5					
All RMA CMP-BSAs	**	15					
Control	**	5					
POND - american pondweed							
CMP-BSA 6	**	4					
7	**	4					
8	**	4					
All RMA CMP-BSAs	**	12					
Control	**	5					
POPE - sego pondweed							
CMP-BSA 6	**	3					
7	**	3					
8	**	3					
All RMA CMP-BSAs	**	9					
Control	**	5					

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

**Sample analysis has been delayed pending completion of laboratory certification.

BCRL = Sites examined with DDT concentrations below lower certified reporting limit of 0.118 µg/g (MRI) or 0.132 µg/g (ESE) for animal tissue and 0.0753 µg/g (MRI) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

Table 4.2-5 DDE Statistical Results for Aquatic Species on RMA in 1989

Page 1 of 2

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
ANDI - blue-winged teal							
CMP-BSA 10	2	4	0.105	0.127	0.0107	1940	15.7
All RMA CMP-BSAs	2	4	0.105	0.127	0.0107	1940	15.7
Control		0	NA	NA	NA	NA	NA
ANPL - mallard							
CMP-BSA 10	1	3	0.101	0.101	NC	NC	NC
All RMA CMP-BSAs	1	3	0.101	0.101	NC	NC	NC
Control	6	7	0.0668	0.146	0.0459	19.4	5.59
CEDE - coontail							
CMP-BSA 6	**	3					
7	**	3					
All RMA CMP-BSAs	**	6					
Control		0	NA	NA	NA	NA	NA
CHVO - killdeer							
CMP-BSA 6	3	3	2.56	28.8	7.02	4.88	3.52
8	2	2	0.283	3.70	1.02	27.2	6.16
All RMA CMP-BSAs	5	5	0.283	28.8	3.25	15.4	5.22
Control		0	NA	NA	NA	NA	NA
ESLU - pike							
All RMA CMP-BSAs		0	NA	NA	NA	NA	NA
Control	0	3	BCRL	BCRL	NA	NA	NA
FUAM - coot							
CMP-BSA 6	1	2	0.230	0.230	0.0150	2870000	47.3
7	0	4	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	1	6	0.230	0.230	NC	NC	NC
Control	0	5	BCRL	BCRL	NA	NA	NA
ICNE and ICME - bullhead							
CMP-BSA 6	1	1	0.425	0.425	0.425000	1.00	1.00
8	0	5	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	1	6	0.425	0.425	NC	NC	NC
Control	0	6	BCRL	BCRL	NA	NA	NA
ICPU - catfish							
CMP-BSA 6	2	2	0.135	0.209	0.168	1.10	1.36
All RMA CMP-BSAs	2	2	0.135	0.209	0.168	1.10	1.36
Control	0	5	BCRL	BCRL	NA	NA	NA

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

**Sample analysis has been delayed pending completion of laboratory certification.

BCRL = Sites examined with DDE concentrations below lower certified reporting limit of 0.100 µg/g (MRI) or 0.063 µg/g (ESE) for animal tissue and 0.0416 µg/g (MRI) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

Table 4.2-5 DDE Statistical Results for Aquatic Species on RMA in 1989

Page 2 of 2

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
LEMA - bluegill							
CMP-BSA 6	0	5	BCRL	BCRL	NA	NA	NA
7	0	5	BCRL	BCRL	NA	NA	NA
8	0	5	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	15	BCRL	BCRL	NA	NA	NA
Control	0	5	BCRL	BCRL	NA	NA	NA
MISA - bass							
CMP-BSA 6	4	5	0.0958	0.165	0.0503	131	9.10
7	3	5	0.112	0.164	0.0195	1740	15.4
8	4	5	0.0795	0.104	0.0355	56.0	7.44
All RMA CMP-BSAs	11	15	0.0795	0.165	0.0327	126	9.02
Control	0	5	BCRL	BCRL	NA	NA	NA
PLAN - plankton							
CMP-BSA 6	**	5					
7	**	5					
8	**	5					
All RMA CMP-BSAs	**	15					
Control	**	5					
POND - american pondweed							
CMP-BSA 6	**	4					
7	**	4					
8	**	4					
All RMA CMP-BSAs	**	12					
Control	**	5					
POPE - sego pondweed							
CMP-BSA 6	**	3					
7	**	3					
8	**	3					
All RMA CMP-BSAs	**	9					
Control	**	5					

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

**Sample analysis has been delayed pending completion of laboratory certification.

BCRL = Sites examined with DDE concentrations below lower certified reporting limit of 0.100 µg/g (MRI) or 0.063 µg/g (ESE) for animal tissue and 0.0416 µg/g (MRI) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

Table 4.2-6 Arsenic Statistical Results for Aquatic Species on RMA in 1989

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
ANDI - blue-winged teal							
CMP-BSA 10	0	4	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	4	BCRL	BCRL	NA	NA	NA
Control		0	NA	NA	NA	NA	NA
ANPL - mallard							
CMP-BSA 10	0	3	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	3	BCRL	BCRL	NA	NA	NA
Control	0	7	BCRL	BCRL	NA	NA	NA
CEDE - coontail							
CMP-BSA 6	1	3	0.443	0.443	NC	NC	NC
7	0	3	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	1	6	0.443	0.443	NC	NC	NC
Control		0	NA	NA	NA	NA	NA
CHVO - killdeer							
CMP-BSA 6	0	3	BCRL	BCRL	NA	NA	NA
8	0	2	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	5	BCRL	BCRL	NA	NA	NA
Control		0	NA	NA	NA	NA	NA
ESLU - pike							
All RMA CMP-BSAs		0	NA	NA	NA	NA	NA
Control	0	3	BCRL	BCRL	NA	NA	NA
FUAM - coot							
CMP-BSA 6	0	2	BCRL	BCRL	NA	NA	NA
7	0	4	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	6	BCRL	BCRL	NA	NA	NA
Control	0	5	BCRL	BCRL	NA	NA	NA
ICNE and ICME - bullhead							
CMP-BSA 6	0	1	BCRL	BCRL	NA	NA	NA
8	0	5	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	6	BCRL	BCRL	NA	NA	NA
Control	0	6	BCRL	BCRL	NA	NA	NA
ICPU - catfish							
CMP-BSA 6	0	2	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	2	BCRL	BCRL	NA	NA	NA
Control	1	5	2.42	2.42	NC	NC	NC
LEMA - bluegill							
CMP-BSA 6	0	5	BCRL	BCRL	NA	NA	NA
7	0	5	BCRL	BCRL	NA	NA	NA
8	0	5	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	15	BCRL	BCRL	NA	NA	NA
Control	0	5	BCRL	BCRL	NA	NA	NA
MISA - bass							
CMP-BSA 6	0	5	BCRL	BCRL	NA	NA	NA
7	0	5	BCRL	BCRL	NA	NA	NA
8	0	5	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	15	BCRL	BCRL	NA	NA	NA
Control	0	5	BCRL	BCRL	NA	NA	NA

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

BCRL = Sites examined with arsenic concentrations below lower certified reporting limit of 0.438 µg/g (MRI) or 0.25 µg/g (ESE) for animal tissue and 0.250 µg/g (MRI) or 0.25 µg/g (ESE) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

Table 4.2-6 Arsenic Statistical Results for Aquatic Species on RMA in 1989

Page 2 of 2

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
PLAN - plankton							
CMP-BSA 6	5	5	0.459	0.644	0.546	1.02	1.16
7	1	5	0.400	0.400	NC	NC	NC
8	1	5	0.429	0.429	NC	NC	NC
All RMA CMP-BSAs	7	15	0.400	0.644	NC	NC	NC
Control	5	5	0.565	0.875	0.648	1.03	1.19
POND - american pondweed							
CMP-BSA 6	1	4	0.446	0.446	NC	NC	NC
7	0	4	BCRL	BCRL	NA	NA	NA
8	4	4	0.397	0.685	0.527	1.05	1.25
All RMA CMP-BSAs	5	12	0.397	0.685	NC	NC	NC
Control	5	5	0.413	1.56	0.719	1.35	1.73
POPE - sego pondweed							
CMP-BSA 6	3	3	0.521	0.805	0.614	1.06	1.27
7	0	3	BCRL	BCRL	NA	NA	NA
8	3	3	0.462	2.90	1.10	2.34	2.52
All RMA CMP-BSAs	6	9	0.462	2.90	0.438	3.24	2.96
Control	0	5	BCRL	BCRL	NA	NA	NA

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

BCRL = Sites examined with arsenic concentrations below lower certified reporting limit of 0.438 µg/g (MRI) or 0.25 µg/g (ESE) for animal tissue and 0.250 µg/g (MRI) or 0.25 µg/g (ESE) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

Table 4.2-7 Mercury Statistical Results for Aquatic Species on RMA in 1989

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
ANDI - blue-winged teal							
CMP-BSA 10	4	4	0.0816	0.338	0.166826	1.57	1.96
All RMA CMP-BSAs	4	4	0.0816	0.338	0.166826	1.57	1.96
Control		0	NA	NA	NA	NA	NA
ANPL - mallard							
CMP-BSA 10	2	3	0.0882	0.242	0.0644	9.67	4.51
All RMA CMP-BSAs	2	3	0.0882	0.242	0.0644	9.67	4.51
Control	6	7	0.0528	0.0769	0.0484	1.45	1.84
CEDE - coontail							
CMP-BSA 6	0	3	BCRL	BCRL	NA	NA	NA
7	0	3	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	6	BCRL	BCRL	NA	NA	NA
Control		0	NA	NA	NA	NA	NA
CHVO - killdeer							
CMP-BSA 6	3	3	0.0832	0.105	0.0965	1.02	1.14
8	1	2	0.109	0.109	0.0369	10.4	4.62
All RMA CMP-BSAs	4	5	0.0832	0.109	0.0657	2.39	2.54
Control		0	NA	NA	NA	NA	NA
ESLU - pike							
All RMA CMP-BSAs		0	NA	NA	NA	NA	NA
Control	3	3	0.0837	0.162	0.114601	1.12	1.39
FUAM - coot							
CMP-BSA 6	2	2	0.0571	0.0834	0.0690	1.07	1.31
7	3	4	0.0538	0.0596	0.0378	1.87	2.20
All RMA CMP-BSAs	5	6	0.0538	0.0834	0.0462	1.62	2.01
Control	4	5	0.0674	0.137	0.0562	2.21	2.44
ICNE and ICME - bullhead							
CMP-BSA 6	1	1	0.264	0.264	0.264	1.00	1.00
8	5	5	0.0551	0.0863	0.0688	1.03	1.19
All RMA CMP-BSAs	6	6	0.0551	0.264	0.0860	1.39	1.77
Control	0	6	BCRL	BCRL	NA	NA	NA
ICPU - catfish							
CMP-BSA 6	1	2	0.0640	0.0640	0.0283	3.79	3.17
All RMA CMP-BSAs	1	2	0.0640	0.0640	0.0283	3.79	3.17
Control	2	5	0.0637	0.142	NC	NC	NC

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

**Sample analysis has been delayed pending completion of laboratory certification.

BCRL = Sites examined with mercury concentrations below lower certified reporting limit of 0.0463 µg/g (MRI) or 0.05 µg/g (ESE) for animal tissue and 0.0574 µg/g (MRI) or 0.05 µg/g (ESE) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

Table 4.2-7 Mercury Statistical Results for Aquatic Species on RMA in 1989

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
LEMA - bluegill							
CMP-BSA 6	5	5	0.0572	0.138	0.0843	1.11	1.38
7	4	5	0.0610	0.202	0.0617	2.75	2.73
8	5	5	0.0708	0.205	0.131	1.21	1.54
All RMA CMP-BSAs	14	15	0.0572	0.205	0.0879	1.61	1.99
Control	5	5	0.0559	0.177	0.0929	1.23	1.58
MISA - bass							
CMP-BSA 6	5	5	0.223	0.303	0.260	1.02	1.13
7	5	5	0.0615	0.570	0.175	1.94	2.26
8	5	5	0.106	0.241	0.160	1.10	1.35
All RMA CMP-BSAs	15	15	0.0615	0.570	0.194	1.30	1.68
Control	5	5	0.0703	0.980	0.142	3.36	3.01
PLAN - plankton							
CMP-BSA 6	0	5	BCRL	BCRL	NA	NA	NA
7	0	5	BCRL	BCRL	NA	NA	NA
8	0	5	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	15	BCRL	BCRL	NA	NA	NA
Control	0	5	BCRL	BCRL	NA	NA	NA
POND - american pondweed							
CMP-BSA 6	0	4	BCRL	BCRL	NA	NA	NA
7	0	4	BCRL	BCRL	NA	NA	NA
8	1	4	0.0514	0.0514	NC	NC	NC
All RMA CMP-BSAs	1	12	0.0514	0.0514	NC	NC	NC
Control	0	5	BCRL	BCRL	NA	NA	NA
POPE - scgo pondweed							
CMP-BSA 6	0	3	BCRL	BCRL	NA	NA	NA
7	0	3	BCRL	BCRL	NA	NA	NA
8	0	3	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	9	BCRL	BCRL	NA	NA	NA
Control	0	5	BCRL	BCRL	NA	NA	NA

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

**Sample analysis has been delayed pending completion of laboratory certification.

BCRL = Sites examined with mercury concentrations below lower certified reporting limit of 0.0463 µg/g (MRI) or 0.05 µg/g (ESE) for animal tissue and 0.0574 µg/g (MRI) or 0.05 µg/g (ESE) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

Table 4.2-8 Summary of Detection Frequencies Among Aquatic Trophic Groups and Species Collected in CMP-BSAs

Trophic Group: Species Code: Analyte	Primary Producers			Primary Consumers		Water-Column Omnivores			Bottom-Feeding Omnivores							
	CEDE	POPE	POND	Σ	%	PLAN	%	ANPL	ANDI	FUAM	Σ	%	ICME/ICNE	ICPU	Σ	%
Aldrin	*	*	*	*	*	*	*	1/3	0/4	0/6	1/13	7.7	0/6	0/2	0/8	0
Dieldrin	*	*	*	*	*	*	*	3/3	4/4	6/6	13/13	100	3/6	2/2	5/8	63
Endrin	*	*	*	*	*	*	*	1/3	0/4	0/6	1/13	7.7	0/6	0/2	0/8	0
DDT	*	*	*	*	*	*	*	0/3	0/4	0/6	0/13	0	0/6	0/2	0/8	0
DDE	*	*	*	*	*	*	*	1/3	2/4	1/6	4/13	31	1/6	2/2	3/8	38
Arsenic	1/6	6/9	5/12	12/27	44	7/15	47	0/3	0/4	0/6	0/13	0	0/6	0/2	0/8	0
Mercury	0/6	0/9	1/12	1/27	3.7	0/15	0	2/3	4/4	5/6	11/13	85	6/6	1/2	7/8	88
Σ	1/12	6/18	6/24	13/54		7/30		8/21	10/28	12/42	30/91		10/42	5/14	15/56	
%	8.3	33	25	24		23		38	36	29	33		24	36	27	
Trophic Group Species Code:	Primary Carnivores			Σ	%	Top Carnivores			Species Code							
Analyte	CHVO	LEMA						MISA	%							
Aldrin	0/5	0/15		0/20	0	0		0/15	0				ANDI	=	Blue-Winged Teal	
Dieldrin	5/5	11/15		16/20	80	80		14/15	93				ANPL	=	Mallard	
Endrin	3/5	0/15		3/20	15	15		1/15	6.7				CEDE	=	Coontail	
DDT	2/5	0/15		2/20	10	10		0/15	0				CHVO	=	Killdeer	
DDE	5/5	0/15		5/20	25	25		11/15	73				FUAM	=	American Coot	
Arsenic	0/5	0/15		0/20	0	0		0/15	0				ICME/ICNE	=	Black and Brown Bullhead	
Mercury	5/5	14/15		18/20	90	90		15/15	100				LEMA	=	Bluegill	
Σ	19/35	25/105		44/140				41/105					ICPU	=	Channel Catfish	
%	54	24		31				39					MISA	=	Largemouth Bass	
													PLAN	=	Plankton	
													POPE	=	Sego Pondweed	
													POND	=	American Pondweed	

*Not Analyzed

Table 4.2-9 Aldrin Statistical Results for Aquatic Trophic Level Combinations on RMA in 1989

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
ABFO - bottom feeding omnivore							
CMP-BSA 6	0	3	BCRL	BCRL	NA	NA	NA
8	0	5	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	8	BCRL	BCRL	NA	NA	NA
Control	0	11	BCRL	BCRL	NA	NA	NA
AWCO - water column omnivore							
CMP-BSA 6	0	2	BCRL	BCRL	NA	NA	NA
7	0	4	BCRL	BCRL	NA	NA	NA
10	1	7	0.0934	0.0934	NC	NC	NC
All RMA CMP-BSAs	1	13	0.0934	0.0934	NC	NC	NC
Control	0	12	BCRL	BCRL	NA	NA	NA
APCA - primary carnivore							
CMP-BSA 6	0	8	BCRL	BCRL	NA	NA	NA
7	0	5	BCRL	BCRL	NA	NA	NA
8	0	7	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	20	BCRL	BCRL	NA	NA	NA
Control	0	5	BCRL	BCRL	NA	NA	NA
APCO - primary consumer							
CMP-BSA 6	**	5					
7	**	5					
8	**	5					
All RMA CMP-BSAs	**	15					
Control	**	5					
APPR - primary producer							
CMP-BSA 6	**	10					
7	**	10					
8	**	7					
All RMA CMP-BSAs	**	27					
Control	**	10					
ATCA - top carnivore							
CMP-BSA 6	0	5	BCRL	BCRL	NA	NA	NA
7	0	5	BCRL	BCRL	NA	NA	NA
8	0	5	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	15	BCRL	BCRL	NA	NA	NA
Control	0	8	BCRL	BCRL	NA	NA	NA

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

**Sample analysis has been delayed pending completion of laboratory certification.

BCRL = Sites examined with aldrin concentrations below lower certified reporting limit of 0.103 µg/g (MRI) or 0.013 µg/g (ESE) for animal tissue and 0.0663 µg/g (MRI) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

Table 4.2-10 Dieldrin Statistical Results for Aquatic Trophic Level Combinations on RMA in 1989

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
ABFO - bottom feeding omnivore							
CMP-BSA 6	3	3	0.0504	0.155	0.0892	1.37	1.75
8	2	5	0.0350	0.0402	NC	NC	NC
All RMA CMP-BSAs	5	8	0.0350	0.155	0.0139	96.0	8.47
Control	0	11	BCRL	BCRL	NA	NA	NA
AWCO - water column omnivore							
CMP-BSA 6	2	2	0.0202	0.101	0.0452	3.65	3.12
7	4	4	0.106	0.176	0.130	1.05	1.25
10	7	7	0.0697	3.81	0.359	4.69	3.47
All RMA CMP-BSAs	13	13	0.0202	3.81	0.191	4.58	3.43
Control	0	12	BCRL	BCRL	NA	NA	NA
APCA - primary carnivore							
CMP-BSA 6	5	8	0.0194	1.37	0.0311	25100	24.1
7	5	5	0.0486	0.981	0.154	4.18	3.31
8	6	7	0.0348	1.14	0.0869	234	10.3
All RMA CMP-BSAs	16	20	0.0194	1.37	0.0664	499	12.1
Control	0	5	BCRL	BCRL	NA	NA	NA
APCO - primary consumer							
CMP-BSA 6	**	5					
7	**	5					
8	**	5					
All RMA CMP-BSAs	**	15					
Control	**	5					
APPR - primary producer							
CMP-BSA 6	**	10					
7	**	10					
8	**	7					
All RMA CMP-BSAs	**	27					
Control	**	10					
ATCA - top carnivore							
CMP-BSA 6	4	5	0.0224	0.0537	0.0181	12.9	4.95
7	5	5	0.0616	0.533	0.161	2.04	2.32
8	5	5	0.0216	0.132	0.0588	1.54	1.93
All RMA CMP-BSAs	14	15	0.0216	0.533	0.0556	6.77	3.99
Control	0	8	BCRL	BCRL	NA	NA	NA

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

**Sample analysis has been delayed pending completion of laboratory certification.

BCRL = Sites examined with dieldrin concentrations below lower certified reporting limit of 0.0840 µg/g (MRI) or 0.018 µg/g (ESE) for animal tissue and 0.0592 µg/g (MRI) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

Table 4.2-11 Endrin Statistical Results for Aquatic Trophic Level Combinations on RMA in 1989

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
ABFO - bottom feeding omnivore							
CMP-BSA 6	0	3	BCRL	BCRL	NA	NA	NA
8	0	5	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	8	BCRL	BCRL	NA	NA	NA
Control	0	11	BCRL	BCRL	NA	NA	NA
AWCO - water column omnivore							
CMP-BSA 6	0	2	BCRL	BCRL	NA	NA	NA
7	0	4	BCRL	BCRL	NA	NA	NA
10	1	7	0.104	0.104	NC	NC	NC
All RMA CMP-BSAs	1	13	0.104	0.104	NC	NC	NC
Control	0	12	BCRL	BCRL	NA	NA	NA
APCA - primary carnivore							
CMP-BSA 6	3	8	0.0714	0.195	NC	NC	NC
7	0	5	BCRL	BCRL	NA	NA	NA
8	0	7	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	3	20	0.0714	0.195	NC	NC	NC
Control	0	5	BCRL	BCRL	NA	NA	NA
APCO - primary consumer							
CMP-BSA 6	**	5					
7	**	5					
8	**	5					
All RMA CMP-BSAs	**	15					
Control	**	5					
APPR - primary producer							
CMP-BSA 6	**	10					
7	**	10					
8	**	7					
All RMA CMP-BSAs	**	27					
Control	**	10					
ATCA - top carnivore							
CMP-BSA 6	0	5	BCRL	BCRL	NA	NA	NA
7	1	5	0.0478	0.0478	NC	NC	NC
8	0	5	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	1	15	0.0478	0.0478	NC	NC	NC
Control	0	8	BCRL	BCRL	NA	NA	NA

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

**Sample analysis has been delayed pending completion of laboratory certification.

BCRL = Sites examined with endrin concentrations below lower certified reporting limit of 0.0740 µg/g (MRI) or 0.036 µg/g (ESE) for animal tissue and 0.0465 µg/g (MRI) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

Table 4.2-12 DDT Statistical Results for Aquatic Trophic Level Combinations on RMA in 1989

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
ABFO - bottom feeding omnivore							
CMP-BSA 6	0	3	BCRL	BCRL	NA	NA	NA
8	0	5	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	8	BCRL	BCRL	NA	NA	NA
Control	0	11	BCRL	BCRL	NA	NA	NA
AWCO - water column omnivore							
CMP-BSA 6	0	2	BCRL	BCRL	NA	NA	NA
7	0	4	BCRL	BCRL	NA	NA	NA
10	0	7	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	13	BCRL	BCRL	NA	NA	NA
Control	0	12	BCRL	BCRL	NA	NA	NA
APCA - primary carnivore							
CMP-BSA 6	2	8	0.955	1.22	NC	NC	NC
7	0	5	BCRL	BCRL	NA	NA	NA
8	0	7	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	2	20	0.955	1.22	NC	NC	NC
Control	0	5	BCRL	BCRL	NA	NA	NA
APCO - primary consumer							
CMP-BSA 6	**	5					
7	**	5					
8	**	5					
All RMA CMP-BSAs	**	15					
Control	**	5					
APPR - primary producer							
CMP-BSA 6	**	10					
7	**	10					
8	**	7					
All RMA CMP-BSAs	**	27					
Control	**	10					
ATCA - top carnivore							
CMP-BSA 6	0	5	BCRL	BCRL	NA	NA	NA
7	0	5	BCRL	BCRL	NA	NA	NA
8	0	5	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	15	BCRL	BCRL	NA	NA	NA
Control	0	8	BCRL	BCRL	NA	NA	NA

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

**Sample analysis has been delayed pending completion of laboratory certification.

BCRL = Sites examined with DDT concentrations below lower certified reporting limit of 0.118 µg/g (MRI) or 0.132 µg/g (ESE) for animal tissue and 0.0753 µg/g (MRI) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

Table 4.2-13 DDE Statistical Results for Aquatic Trophic Level Combinations on RMA in 1989

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
ABFO - bottom feeding omnivore							
CMP-BSA 6	3	3	0.135	0.425	0.229	1.40	1.78
8	0	5	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	3	8	0.135	0.425	NC	NC	NC
Control	0	11	BCRL	BCRL	NA	NA	NA
AWCO - water column omnivore							
CMP-BSA 6	1	2	0.230	0.230	0.0150	2870000	47.3
7	0	4	BCRL	BCRL	NA	NA	NA
10	3	7	0.101	0.127	NC	NC	NC
All RMA CMP-BSAs	4	13	0.101	0.230	NC	NC	NC
Control	6	12	0.0668	0.146	0.00926	252	10.5
APCA - primary carnivore							
CMP-BSA 6	3	8	2.56	28.8	NC	NC	NC
7	0	5	BCRL	BCRL	NA	NA	NA
8	2	7	0.283	3.70	NC	NC	NC
All RMA CMP-BSAs	5	20	0.283	28.8	NC	NC	NC
Control	0	5	BCRL	BCRL	NA	NA	NA
APCO - primary consumer							
CMP-BSA 6	**	5					
7	**	5					
8	**	5					
All RMA CMP-BSAs	**	15					
Control	**	5					
APPR - primary producer							
CMP-BSA 6	**	10					
7	**	10					
8	**	7					
All RMA CMP-BSAs	**	27					
Control	**	10					
ATCA - top carnivore							
CMP-BSA 6	4	5	0.0958	0.165	0.0503	131.	9.10
7	3	5	0.112	0.164	0.0195	1740	15.4
8	4	5	0.0795	0.104	0.0355	56.0	7.44
All RMA CMP-BSAs	11	15	0.0795	0.165	0.0327	126.	9.02
Control	0	8	BCRL	BCRL	NA	NA	NA

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

**Sample analysis has been delayed pending completion of laboratory certification.

BCRL = Sites examined with DDE concentrations below lower certified reporting limit of 0.100 µg/g (MRI) or 0.063 µg/g (ESE) for animal tissue and 0.0416 µg/g (MRI) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

Table 4.2-14 Arsenic Statistical Results for Aquatic Trophic Level Combinations on RMA in 1989

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
ABFO - bottom feeding omnivore							
CMP-BSA 6	0	3	BCRL	BCRL	NA	NA	NA
8	0	5	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	8	BCRL	BCRL	NA	NA	NA
Control	1	11	2.42	2.42	NC	NC	NC
AWCO - water column omnivore							
CMP-BSA 6	0	2	BCRL	BCRL	NA	NA	NA
7	0	4	BCRL	BCRL	NA	NA	NA
10	0	7	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	13	BCRL	BCRL	NA	NA	NA
Control	0	12	BCRL	BCRL	NA	NA	NA
APCA - primary carnivore							
CMP-BSA 6	0	8	BCRL	BCRL	NA	NA	NA
7	0	5	BCRL	BCRL	NA	NA	NA
8	0	7	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	20	BCRL	BCRL	NA	NA	NA
Control	0	5	BCRL	BCRL	NA	NA	NA
APCO - primary consumer							
CMP-BSA 6	5	5	0.459	0.644	0.546	1.02	1.16
7	1	5	0.400	0.400	NC	NC	NC
8	1	5	0.429	0.429	NC	NC	NC
All RMA CMP-BSAs	7	15	0.400	0.644	NC	NC	NC
Control	5	5	0.565	0.875	0.648	1.03	1.19
APPR - primary producer							
CMP-BSA 6	5	10	0.443	0.805	0.260	1.86	2.20
7	0	10	BCRL	BCRL	NA	NA	NA
8	7	7	0.397	2.90	0.722	1.59	1.98
All RMA CMP-BSAs	12	27	0.397	2.90	NC	NC	NC
Control	5	10	0.413	1.56	0.300	2.67	2.69
ATCA - top carnivore							
CMP-BSA 6	0	5	BCRL	BCRL	NA	NA	NA
7	0	5	BCRL	BCRL	NA	NA	NA
8	0	5	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	15	BCRL	BCRL	NA	NA	NA
Control	0	8	BCRL	BCRL	NA	NA	NA

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

BCRL = Sites examined with arsenic concentrations below lower certified reporting limit of 0.438 µg/g (MRI) or 0.25 µg/g (ESE) for animal tissue and 0.250 µg/g (MRI) or 0.25 µg/g (ESE) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

Table 4.2-15 Mercury Statistical Results for Aquatic Trophic Level Combinations on RMA in 1989

	Total # of Hits	Total # of Samples	Minimum Detected Conc (µg/g)	Maximum Detected Conc (µg/g)	USFWS Geometric Mean*	USFWS Geometric Variance*	USFWS Geometric Std Dev*
ABFO - bottom feeding omnivore							
CMP-BSA 6	2	3	0.0640	0.264	0.0596	10.3	4.60
8	5	5	0.0551	0.0863	0.0688	1.03	1.19
All RMA CMP-BSAs	7	8	0.0551	0.264	0.0651	1.99	2.29
Control	2	11	0.0637	0.142	NC	NC	NC
AWCO - water column omnivore							
CMP-BSA 6	2	2	0.0571	0.0834	0.0690	1.07	1.31
7	3	4	0.0538	0.0596	0.0378	1.86	2.20
10	6	7	0.0816	0.338	0.111	3.46	3.06
All RMA CMP-BSAs	11	13	0.0538	0.338	0.0740	2.80	2.76
Control	10	12	0.0528	0.137	0.0515	1.64	2.02
APCA - primary carnivore							
CMP-BSA 6	8	8	0.0572	0.138	0.0887	1.07	1.30
7	4	5	0.0610	0.202	0.0617	2.75	2.73
8	6	7	0.0708	0.205	0.0911	2.45	2.58
All RMA CMP-BSAs	18	20	0.0572	0.205	0.0818	1.73	2.10
Control	5	5	0.0559	0.177	0.0929	1.23	1.58
APCO - primary consumer							
CMP-BSA 6	0	5	BCRL	BCRL	NA	NA	NA
7	0	5	BCRL	BCRL	NA	NA	NA
8	0	5	BCRL	BCRL	NA	NA	NA
All RMA CMP-BSAs	0	15	BCRL	BCRL	NA	NA	NA
Control	0	5	BCRL	BCRL	NA	NA	NA
APPR - primary producer							
CMP-BSA 6	0	10	BCRL	BCRL	NA	NA	NA
7	0	10	BCRL	BCRL	NA	NA	NA
8	1	7	0.0514	0.0514	NC	NC	NC
All RMA CMP-BSAs	1	27	0.0514	0.0514	NC	NC	NC
Control	0	10	BCRL	BCRL	NA	NA	NA
ATCA - top carnivore							
CMP-BSA 6	5	5	0.223	0.303	0.260	1.01	1.13
7	5	5	0.0615	0.570	0.175	1.94	2.26
8	5	5	0.106	0.241	0.160	1.10	1.35
All RMA CMP-BSAs	15	15	0.0615	0.570	0.194	1.30	1.68
Control	8	8	0.0703	0.980	0.131	2.09	2.36

*The USFWS geometric mean includes non hits and assigns them a value equal to one-half of the lower CRL; descriptive statistics are calculated only when 50% or more of the samples are hits.

BCRL = Sites examined with mercury concentrations below lower certified reporting limit of 0.0463 µg/g (MRI) or 0.05 µg/g (ESE) for animal tissue and 0.0574 µg/g (MRI) or 0.05 µg/g (ESE) for plant tissue.

NA = Not applicable.

NC = number of detections were less than 50% of the sample size and a mean was not calculated.

SAMPLING LOCATION	SPTR	FASP	SYAU	MISA	ANFL
ALDRIN					
B11588			BCRL-4*		
B11588			BCRL-5		
B30188			BCRL-2		
B55988			BCRL-5		
B55988			BCRL-5		
B65188	BCRL-2				
BU0188		BCRL-2			
BU1288		BCRL-2			
BU3588		BCRL-2@			
BU3688			0.800-5		
BU3688			BCRL-4		
BUD88				BCRL-2	
BC0288				BCRL-1@	
DIELDRIN					
B11588			2.20-5		
B11588			BCRL-4		
B30188			1.50-2		
B55988			1.70-5		
B55988			0.562-5		
B65188	1.10-2				
BU0188		3.70-2			
BU1288		0.461-2			
BU3588		1.70-2			
BU3688			0.890-4		
BUD88					0.775-2
BC0288				BCRL-1@	

@ Value also reported in 1988

* The hyphenated number code at the end of each value or BCRL represents a tissue. See the tissue key is found at the end of this table.

**** The common name for each species represented by the acronym headings is presented at the end of this table.**

*** These values replace the 1988 reported values.

BCRL = Sites examined with analyte concentrations below lower certified reporting limits.

NTR = Not Required

GT = Greater than the certifiable reporting limit.

NOTE: Duplicate study sites indicate multiple samples of at least one species.

SAMPLING LOCATION	SPTR	FASP	SYAU	MISA	ANPL
PTDDE					
B11588			BCRL-4*		
B11588			BCRL-5		
B30188			BCRL-2		
B55988			BCRL-5		
B55988			BCRL-5		
B65188	BCRL-2				
BU0188		0.401-2			
BU1288		0.114-2			
BU3588		0.122-2			
BU3688			BCRL-4		
BU3688			BCRL-5		
BUD88				0.154-2	
BC0288				BCRL-1@	
ARSENIC					
B11588			BCRL-5@		
B11588			NR		
B30188			BCRL-2@		
B55988			BCRL-5@		
B55988			BCRL-5@		
B65188	BCRL-2@				
BU0188		BCRL-2@			
BU1288		BCRL-2@			
BU3588		BCRL-2@			
BU3688			BCRL-5@		
BU3688			NR-4		

@ Value also reported in 1988

* The hyphenated number code at the end of each value or BCRL represents a tissue. See the tissue key is found at the end of this table.

•• The common name for each species represented by the acronym headings is presented at the end of this table.

*** These values replace the 1988 reported values.

BCRL = Sites examined with analyte concentrations below lower certified reporting limits.

NR = Not Requested

GT = Greater than the certifiable reporting limit.

NOTE: Duplicate study sites indicate multiple samples of at least one species.

Table 4.3-1 Analyte Concentrations (µg/g) of Intentional Samples Collected at Rocky Mountain Arsenal in 1988

SAMPLING LOCATION	SPTR	FASP	SYAU	MISA	ANPL										
BUD88					BCRL-2@										
BC0288					BCRL-2@										
MERCURY															
B11588			BCRL-5@*												
B11588			GT 1.00-4@												
B30188			BCRL-2@												
B55988			BCRL-5@												
B55988			BCRL-5@												
BU0188		BCRL-2@													
BU1288		BCRL-2@													
BU3588		BCRL-2@													
BU3688			BCRL-5@												
BU3688			BCRL-4@												
BUD88															
BC0288				0.0764-1	BCRL-2@										
SPECIES KEY:						TISSUE KEY:									
SPTR = 13-Lined ground squirrel						1 = Whole body									
FASP = American kestrel						2 = Dressed carcass									
SYAU = Desert cottontail						3 = Egg									
MISA = Largemouth bass						4 = Muscle tissue									
ANPL = Mallard						5 = Liver tissue									
						6 = Brain tissue									
						7 = Composite									
						8 = Above substrate plant									
						9 = Leaves and flowers									
						10 = Heart									
						11 = Kidney									
						12 = Body fat									
						13 = Solid stomach contents									
						14 = Liquid stomach contents									
						15 = Gizzard									

@ Value also reported in 1988

* The hyphenated number code at the end of each value or BCRL represents a tissue. See the tissue key is found at the end of this table.

** The common name for each species represented by the acronym headings is presented at the end of this table.

*** These values replace the 1988 reported values.

BCRL = Sites examined with analyte concentrations below lower certified reporting limits.

NOTE: Duplicate study sites indicate multiple samples of at least one species.

NR = Not Requested

GT = Greater than the certifiable reporting limit.

Table 4.3-2 Analyte Concentrations (µg/g) of Fortuitous Samples Collected at Rocky Mountain Arsenal in 1988

SAMPLING LOCATION	EUCY**	PIPI	STNB	STVU	TUMI	ZEMA	PIME	BUJA	BURE	BUSW	BUVI	AQCH	HALB	TATA
ALDRIN														
B20288			BCRL-2*								BCRL-4			
B40188											BCRL-5			
B40188											BCRL-6			
B40188												BCRL-4	BCRL-4	
BCFW89												BCRL-5	BCRL-5	
BCFW89												BCRL-15		
BCFW89														
BU0188	BCRL-2*													
BU0188								BCRL-4						
BU0189								BCRL-5						
BU0288							BCRL-1				BCRL-4			
BU2588			BCRL-2											
BU2588											BCRL-4			
BU2588											BCRL-5			
BU2589									BCRL-5					
BU2589									BCRL-4					
BU3388										BCRL-4				
BU3388										BCRL-5				
BU3588		BCRL-2		BCRL-2	BCRL-2	BCRL-2		BCRL-4						
BU3588					BCRL-2									
BU3588					BCRL-2			BCRL-5						
BU3588					BCRL-2									
BU3588					BCRL-2									
BU3588					BCRL-2									
BU3688														BCRL-4
BU3688														BCRL-5
BU3688														BCRL-6

* The hyphenated number code at the end of each value or BCRL represents a tissue. The tissue key is found at the end of this table.

** The common name for each species represented by the acronym headings is presented at the end of this table.

BCRL = Sites examined with analyte concentrations below lower certified reporting limits.

NOTE: Duplicate study sites indicate multiple samples of at least one species.

* The hyphenated number code at the end of each value or BCRL represents a tissue. The tissue key is found at the end of this table.

*** The common name for each species represented by the acronym headings is presented at the end of this table.

BCRL = Sites examined with analyte concentrations below lower certified reporting limits.

NOTE: Duplicate study sites indicate multiple samples of at least one species.

Table 4.3-2 Analyte Concentrations (µg/g) of Fortuitous Samples Collected at Rocky Mountain Arsenal in 1988

SAMPLING LOCATION	EUCY**	PIPI	STNE	STVU	TUMI	ZEMA	PTMB	BUJA	BURB	BUSW	BUVI	AQCH	HALE	TATA
ENDRIN														
B20288			BCRL-2*								BCRL-4			
B40188											BCRL-6			
B40188												BCRL-15	BCRL-5	
BCFW89												BCRL-4	0.173-4	
BCFW89												BCRL-5		
BCFW89														
BU0188	BCRL-2*							BCRL-4						
BU0188								BCRL-5						
BU0189							BCRL-1				BCRL-4			
BU0288														
BU2588			0.130-2											
BU2588									0.233-5		BCRL-6			
BU2589									BCRL-4					
BU2589														
BU3388											BCRL-4			
BU3388											BCRL-5			
BU3588		BCRL-2		0.394-2				0.125-5						
BU3588						0.190-2		BCRL-4						
BU3588						0.316-2								
BU3588						0.352-2								
BU3688														BCRL-4
BU3688														BCRL-5
BU3688														BCRL-6
BU3688														BCRL-12
BU3688														BCRL-13

* The hyphenated number code at the end of each value or BCRL represents a tissue. The tissue key is found at the end of this table.

** The common name for each species represented by the acronym headings is presented at the end of this table.

BCRL = Sites examined with analyte concentrations below lower certified reporting limits.

NOTE: Duplicate study sites indicate multiple samples of at least one species.

NOTE: Duplicate study sites indicate multiple samples of at least one species.

Table 4.3-2 Analyte Concentrations (µg/g) of Fortuitous Samples Collected at Rocky Mountain Arsenal in 1988

SAMPLING LOCATION	EUZY**	PIPI	STNB	STVU	TUMI	ZEMA	PDMB	BUJA	BURB	BUSW	BUVI	AQCH	HALB	TATA
PPDDE														
B20288			0.149-2*											
B40188											BCRL-4	0.144-15	0.404-5	
BCFW89												0.124-5	1.70-4	
BCFW89												0.639-4		
BU0188	1.10-2*							BCRL-4						
BU0189											0.501-4			
BU0288							BCRL-1							
BU2588			BCRL-2						0.169-5		0.667-4			
BU2589									BCRL-4					
BU3388										BCRL-4				
BU3388										BCRL-5				
BU3588		2.15-2		4.30-2	BCRL-2	BCRL-2		0.145-5						
BU3588				6.20-2				BCRL-4						
BU3588				6.50-2		BCRL-2								
BU3588						BCRL-2								
BU3688														BCRL-4
BU3688														0.541-5
BU3688														BCRL-6
BU3688														0.506-12
BU3688														BCRL-13
BU3688														BCRL-14

* The hyphenated number code at the end of each value or BCRL represents a tissue. The tissue key is found at the end of this table.

** The common name for each species represented by the acronym headings is presented at the end of this table.

BCRL = Sites examined with analyte concentrations below lower certified reporting limits.

NOTE: Duplicate study sites indicate multiple samples of at least one species.

Table 4.3-2 Analyte Concentrations ($\mu\text{g/g}$) of Fortuitous Samples Collected at Rocky Mountain Arsenal in 1988

SAMPLING LOCATION	BUCY**	PIPI	STNB	STVU	TUMI	ZEMA	PTMB	BUJA	BURB	BUSW	BUVI	AQCH	HALE	TATA
ARSENIC														
B20288			BCRL-2*								BCRL-5			
B40188											BCRL-6			
B40188														
BU0188	BCRL-2*						BCRL-1	BCRL-5						
BU0288			BCRL-2								BCRL-5			
BU2588											BCRL-6			
BU2588														
BU2589														
BU3388														
BU3588		BCRL-2		BCRL-2	BCRL-2	BCRL-2		BCRL-5		BCRL-5				
BU3588				BCRL-2	BCRL-2	BCRL-2								
BU3588				BCRL-2	BCRL-2	BCRL-2								
BU3588				BCRL-2	BCRL-2	BCRL-2								
BU3588				BCRL-2	BCRL-2	BCRL-2								
BU3688														BCRL-5
BU3688														BCRL-6
BU3688														BCRL-12
BU3688														BCRL-13
BU3688														BCRL-14
MERCURY														
B20288			BCRL-2											
B40188														
B40188														
BU0188	BCRL-2							0.0489-5			BCRL-4			
BU0188								BCRL-4						

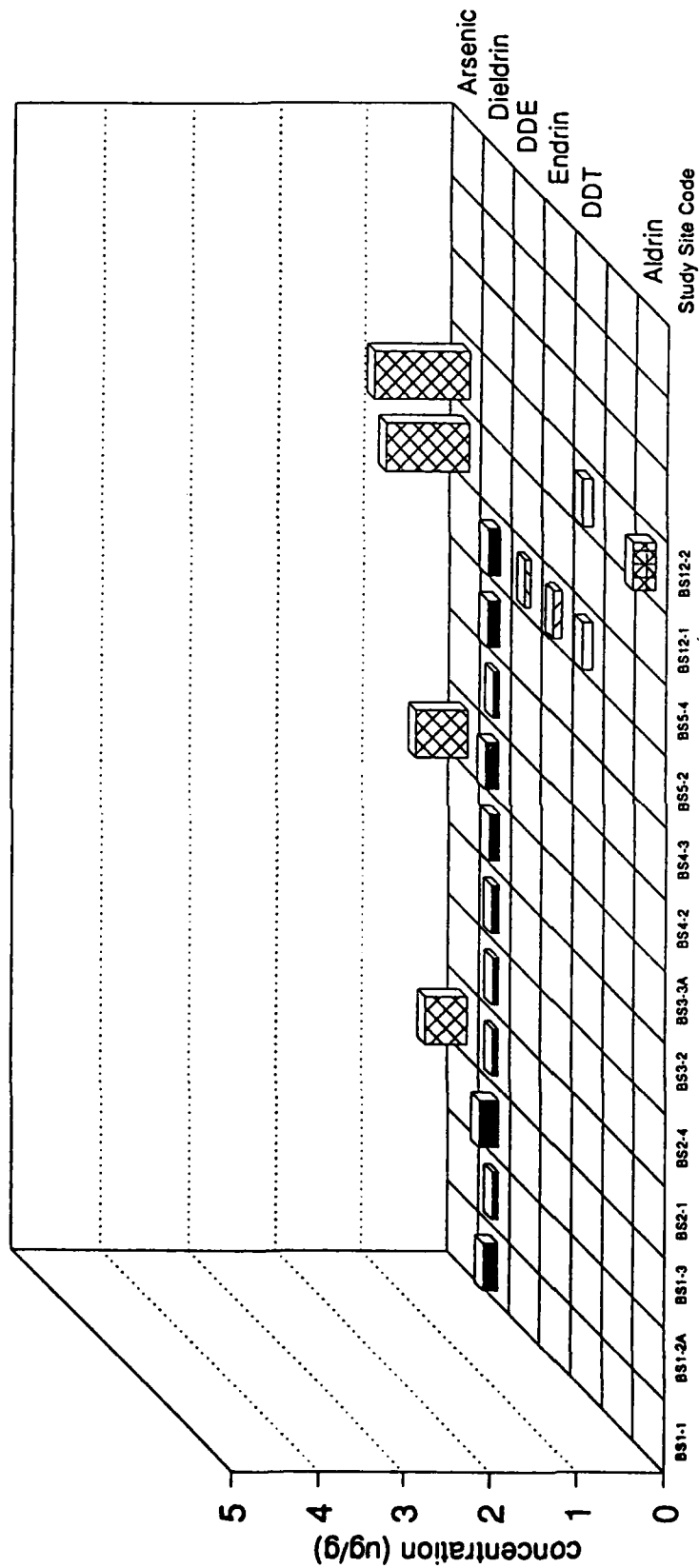
* The hyphenated number code at the end of each value or BCRL represents a tissue. The tissue key is found at the end of this table.

** The common name for each species represented by the acronym headings is presented at the end of this table.

BCRL = Sites examined with analyte concentrations below lower certified reporting limits.

NOTE: Duplicate study sites indicate multiple samples of at least one species.

NOTE: Duplicate study sites indicate multiple samples of at least one species.



Sites examined with analyte concentrations below certified reporting limits: BS1-4, BS2-2A, BS2-3A, BS2-5, BS3-4, BS4-4, BS5-1, BS5-3A, BS5-6, BS11-1, BS11-2, BS11-3, BCRM-1, BCRM-2, BCRM-3A, BCRM-4, BCRM-5A, BCRM-6.

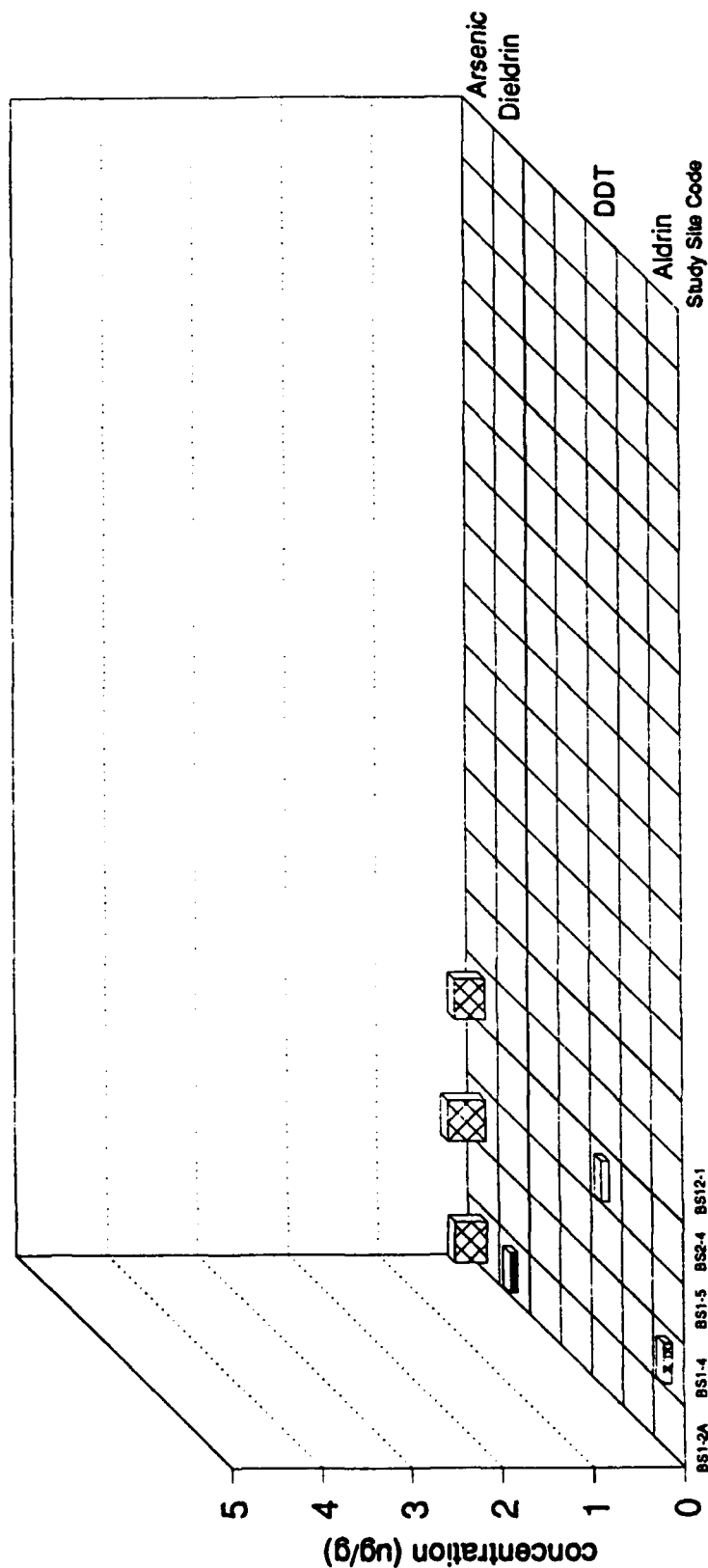
 Aldrin
  DDE
  Mercury
  Dieldrin
  Arsenic
  DDT
  Endrin

Prepared for:

U. S. Army Program Manager for
Rocky Mountain Arsenal
Commerce City, Colorado
Prepared by: R.L. Stolar and Associates, Inc.
Ebasco Environmental

Figure 4.1-1

Analyte Concentrations vs. Study Site
Chealgrass at RMA, 1989
CMP Biola Contamination Assessment
Drafted: 3/22/89



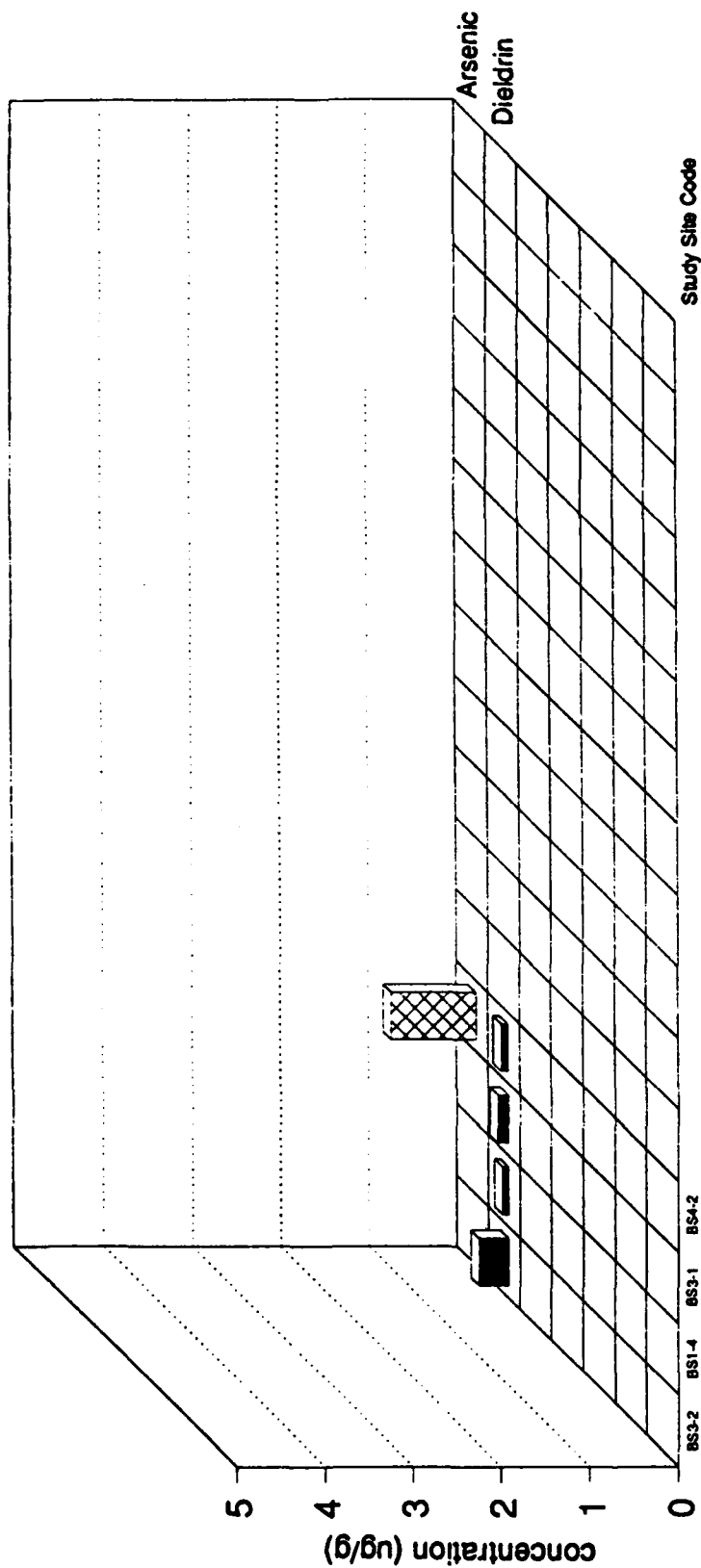
 Aldrin
  DDE
  Mercury
  Dieldrin
  DDT
  Arsenic
  Endrin

Sites examined with analyte concentrations below certified reporting limits: BS2-1, BS2-2A, BS2-3A, BS3-3A, BS3-4, BS5-1, BS5-2, BS5-3A, BS5-4, BS11-1, BS12-2, BCRM-2, BCRM-3A, BCRM-4, BCRM-5A, BCRM-6.

Sample analysis for OCP's has been delayed pending completion of laboratory certification.

Prepared for:
 U. S. Army Program Manager for
 Rocky Mountain Arsenal
 Commerce City, Colorado
 Prepared by: R.L. Stollar and Associates, Inc.
 Ebasco Environmental

Figure 4.1-2
 Analyte Concentrations vs. Study Site
 Kochia at RMA, 1989
 CMP Biota Contamination Assessment
 Drafted: 3/22/89



Sample analysis for OCP's has been delayed pending completion of laboratory certification.

Sites examined with analyte concentrations below certified reporting limits: BS1-2A, BS1-3, BS2-5, BS4-4, BS5-6, BCRM-1, BCRM-5, BCRM-5A.

Prepared for:

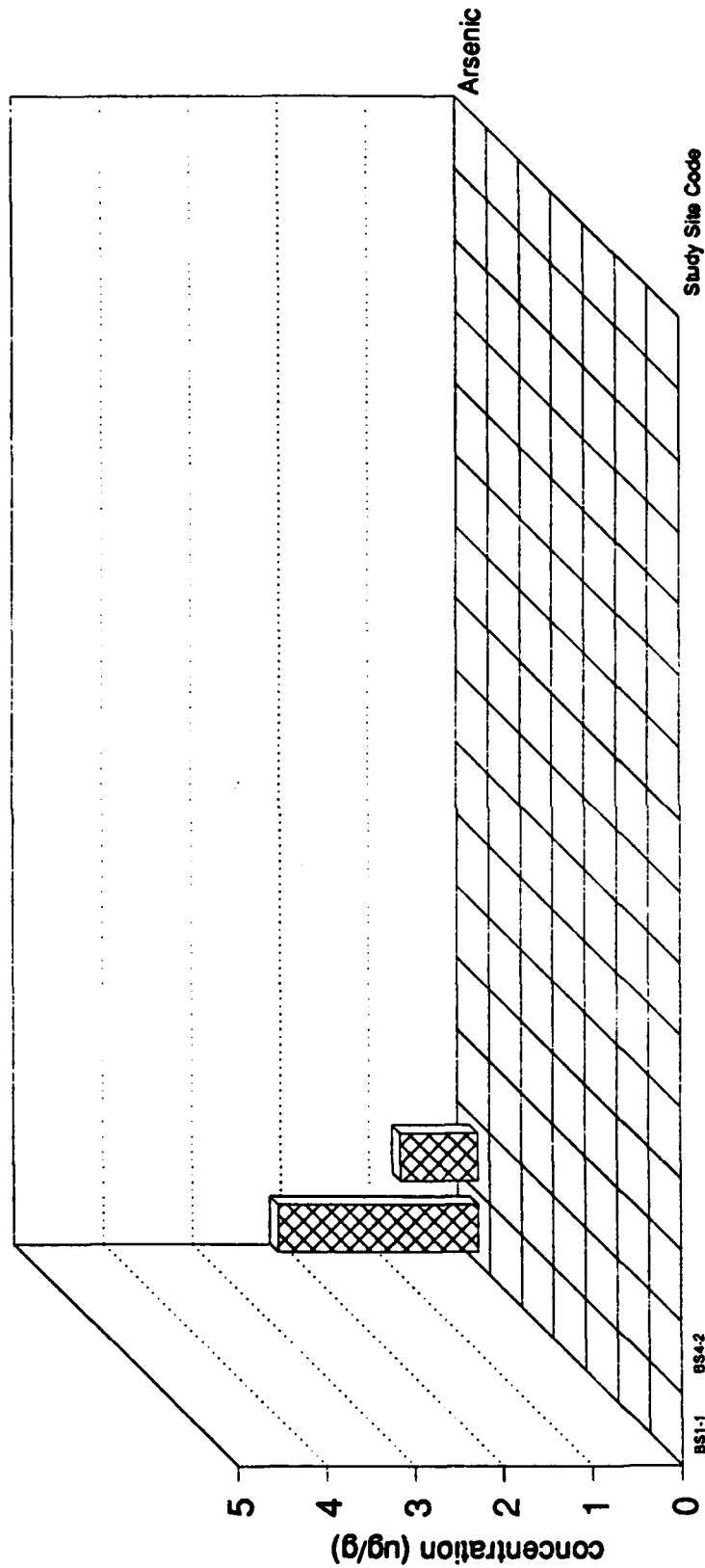
U. S. Army Program Manager for
Rocky Mountain Arsenal
Commerce City, Colorado

Prepared by: R.L. Stollar and Associates, Inc.
Ebasco Environmental

Figure 4.1-3

Analyte Concentrations vs. Study Site
Prickly Lettuce at RMA, 1989

CMP Biota Contamination Assessment
Dated: 3/22/89

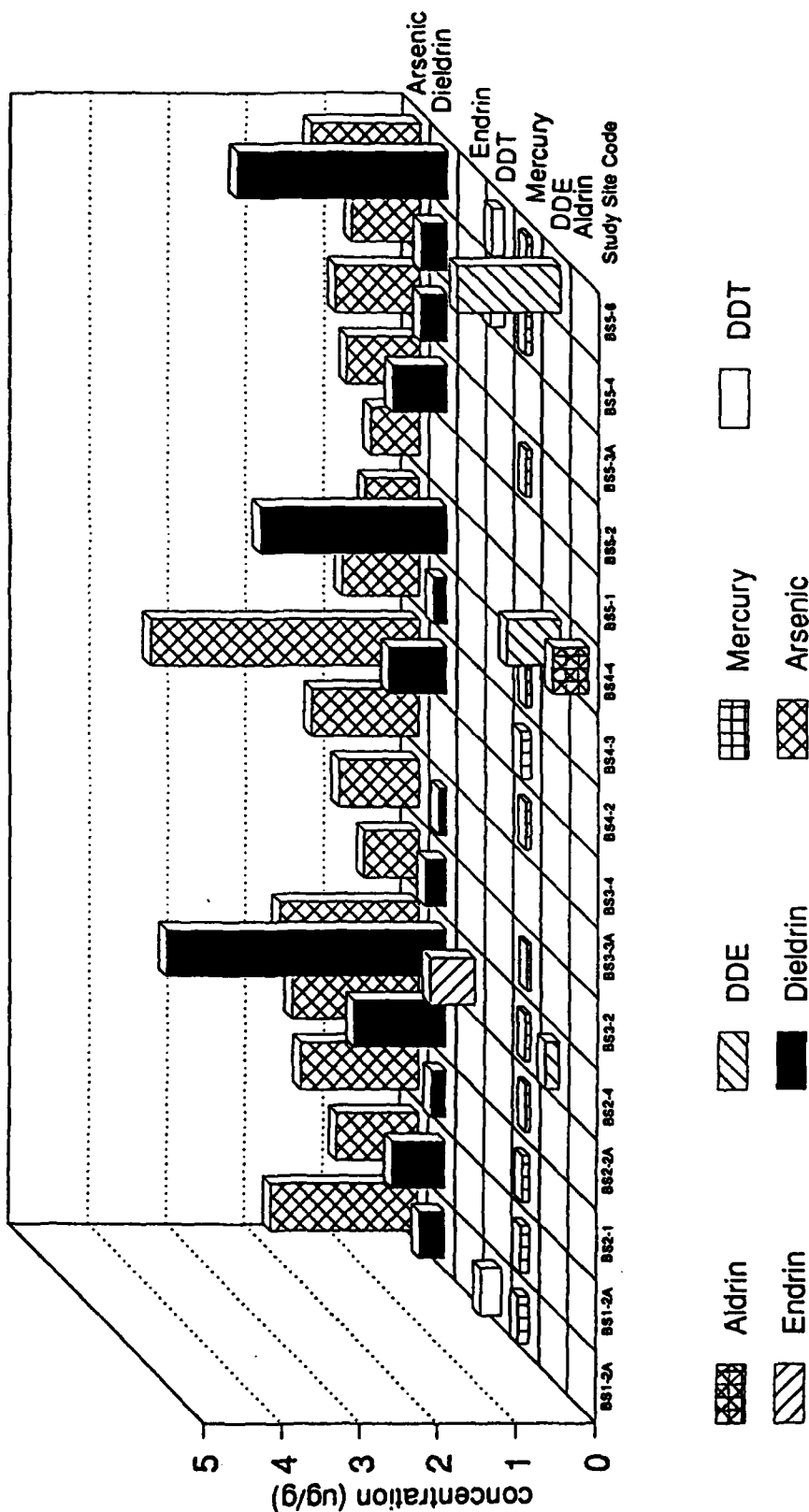


Aldrin Mercury DDT Endrin
 DDE Dieldrin Arsenic

Sample analysis for OCP's has been delayed pending completion of laboratory certification.

Figure 4.1-4
 Analyte Concentrations vs. Study Site
 Sunflower at RMA, 1989
 CMP Biota Contamination Assessment
 Drafted: 3/22/89

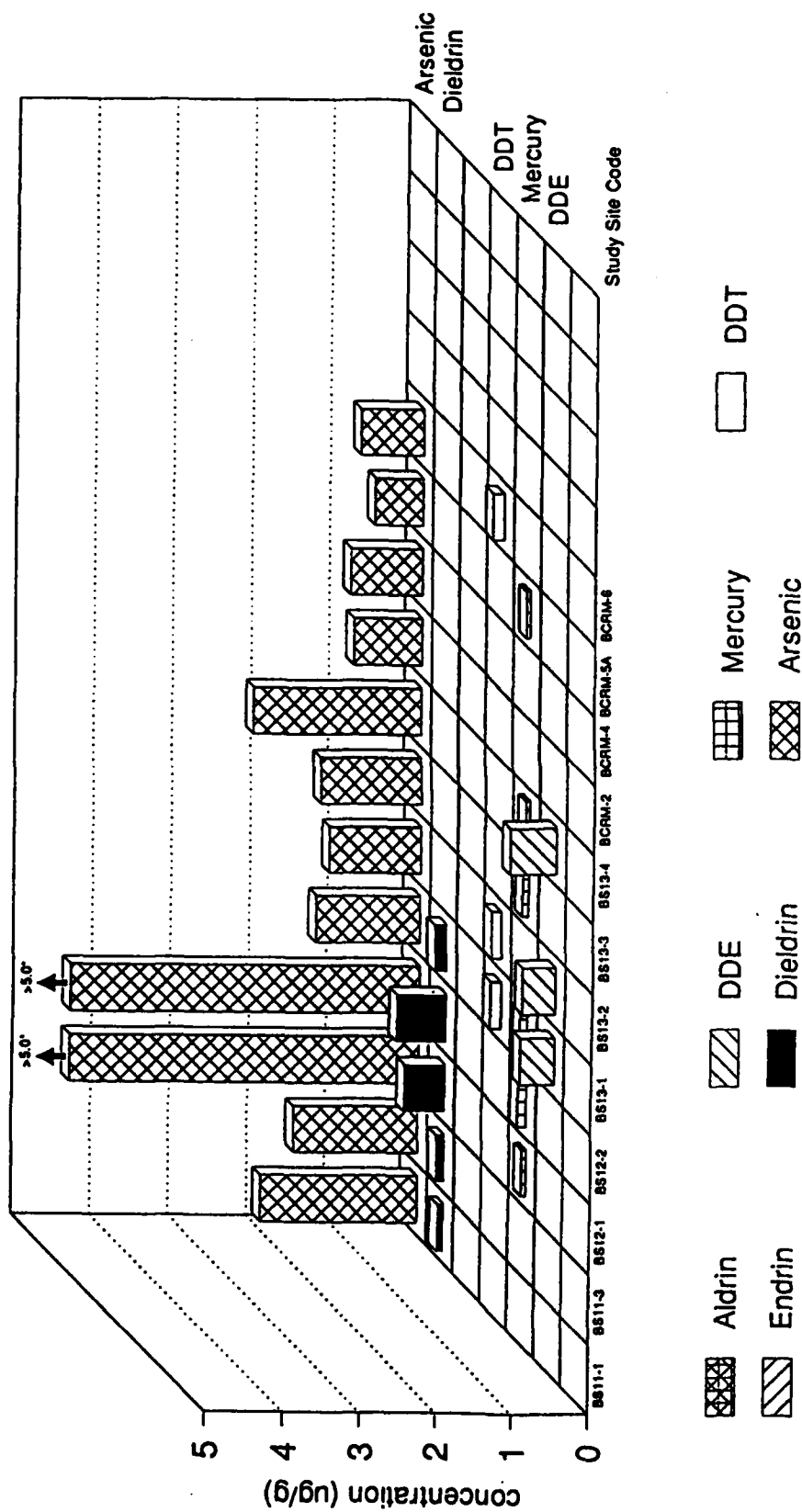
Prepared for:
 U. S. Army Program Manager for
 Rocky Mountain Arsenal
 Commerce City, Colorado
 Prepared by: R.L. Stollar and Associates, Inc.
 Ebasco Environmental



Study sites examined with analyte concentrations below certified reporting limits: See Page 2.

Prepared for:
U. S. Army Program Manager for
Rocky Mountain Arsenal
Commerce City, Colorado
Prepared by: R.L. Stollar and Associates, Inc.
Ebasco Environmental

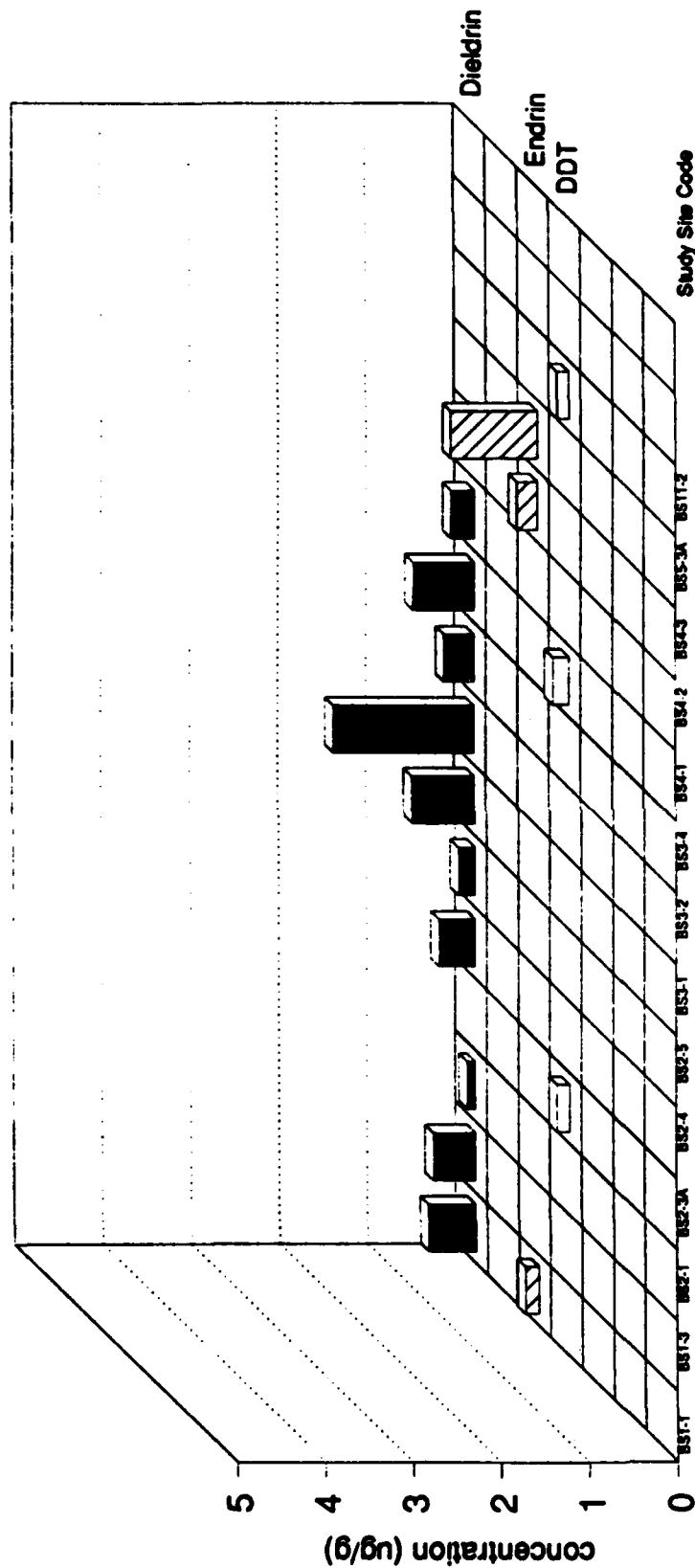
Figure 4.1-5
Analyte Concentrations vs. Study Site
Earthworm at RMA, 1989
CMP Biota Contamination Assessment
Drafted: 3/22/89



Study sites examined with analyte concentrations below certified reporting limits: BCRM-3A.

*Arsenic concentration > upper certified reporting limit for two samples.

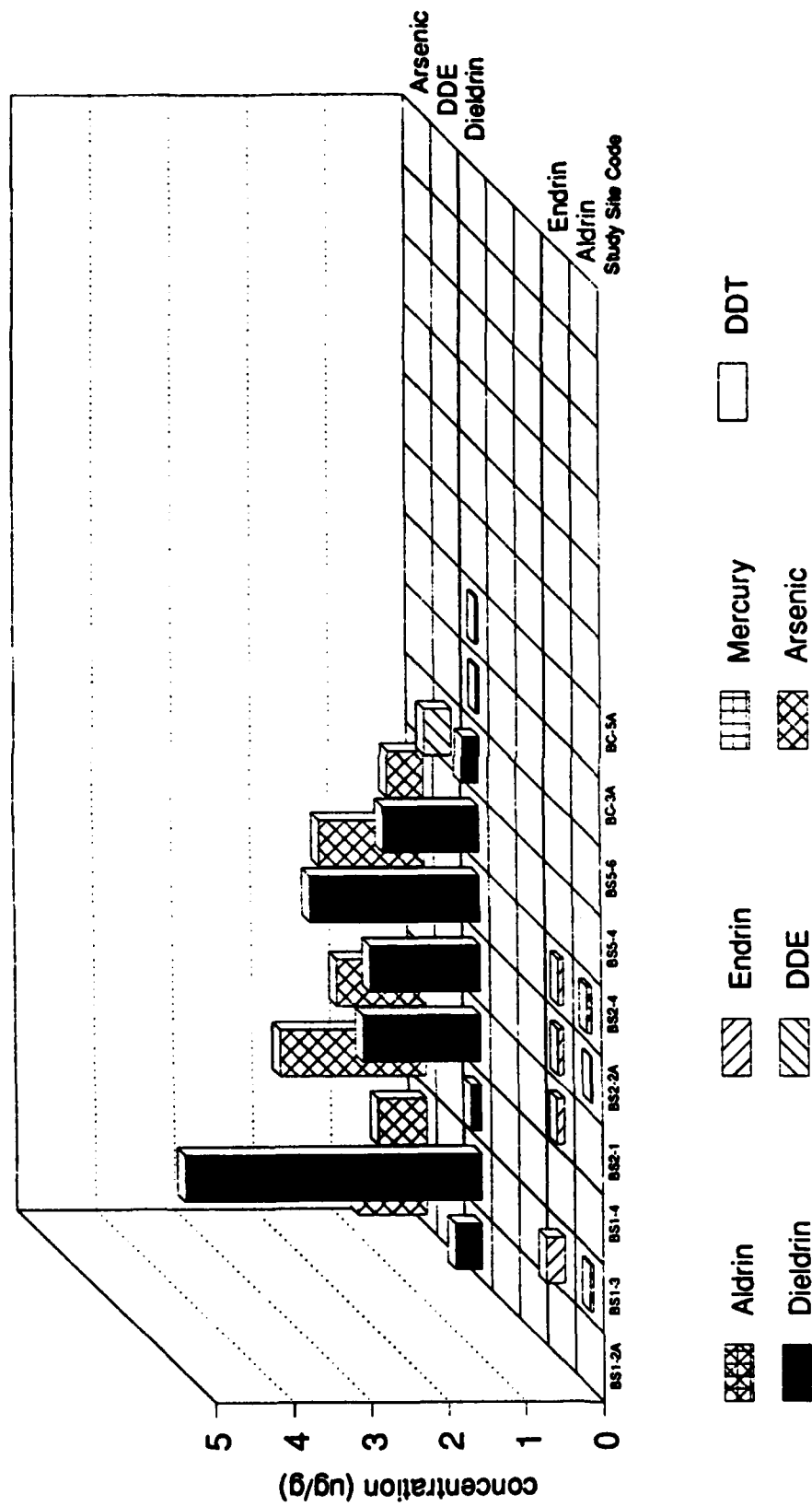
Prepared for: U. S. Army Program Manager for Rocky Mountain Arsenal Commerce City, Colorado Prepared by: R.L. Stollar and Associates, Inc. Ebasco Environmental	Figure 4.1-5 Analyte Concentrations vs. Study Site Earthworm at RMA, 1989 CMP Biota Contamination Assessment Dated: 3/22/89
--	---



Study sites examined with analyte concentrations below certified reporting limits: BS1-2A, BS1-4, BS1-5, BS2-2A, BS3-3, BS4-4, BS5-1, BS5-2, BCDJ, BCRM-1, BCRM-5, BCRM-6.



Prepared for: U. S. Army Program Manager for Rocky Mountain Arsenal Commerce City, Colorado Prepared by: R.L. Stolar and Associates, Inc. Ebasco Environmental	Figure 4.1-6 Analyte Concentrations vs. Study Site Grasshopper at RMA, 1989 CMP Biota Contamination Assessment Drafted: 3/22/89
---	---



Study sites examined with analyte concentrations below certified reporting limits: BCRM-6.

Prepared for:
 U. S. Army Program Manager for
 Rocky Mountain Arsenal
 Commerce City, Colorado
 Prepared by: R.L. Stollar and Associates, Inc.
 Ebasco Environmental

Figure 4.1-7
 Analyte Concentrations vs. Study Site
 Ground Beetle at RMA, 1989
 CMP Biota Contamination Assessment
 Drafted: 3/22/89



*Results not received for mercury analysis.

Prepared for:

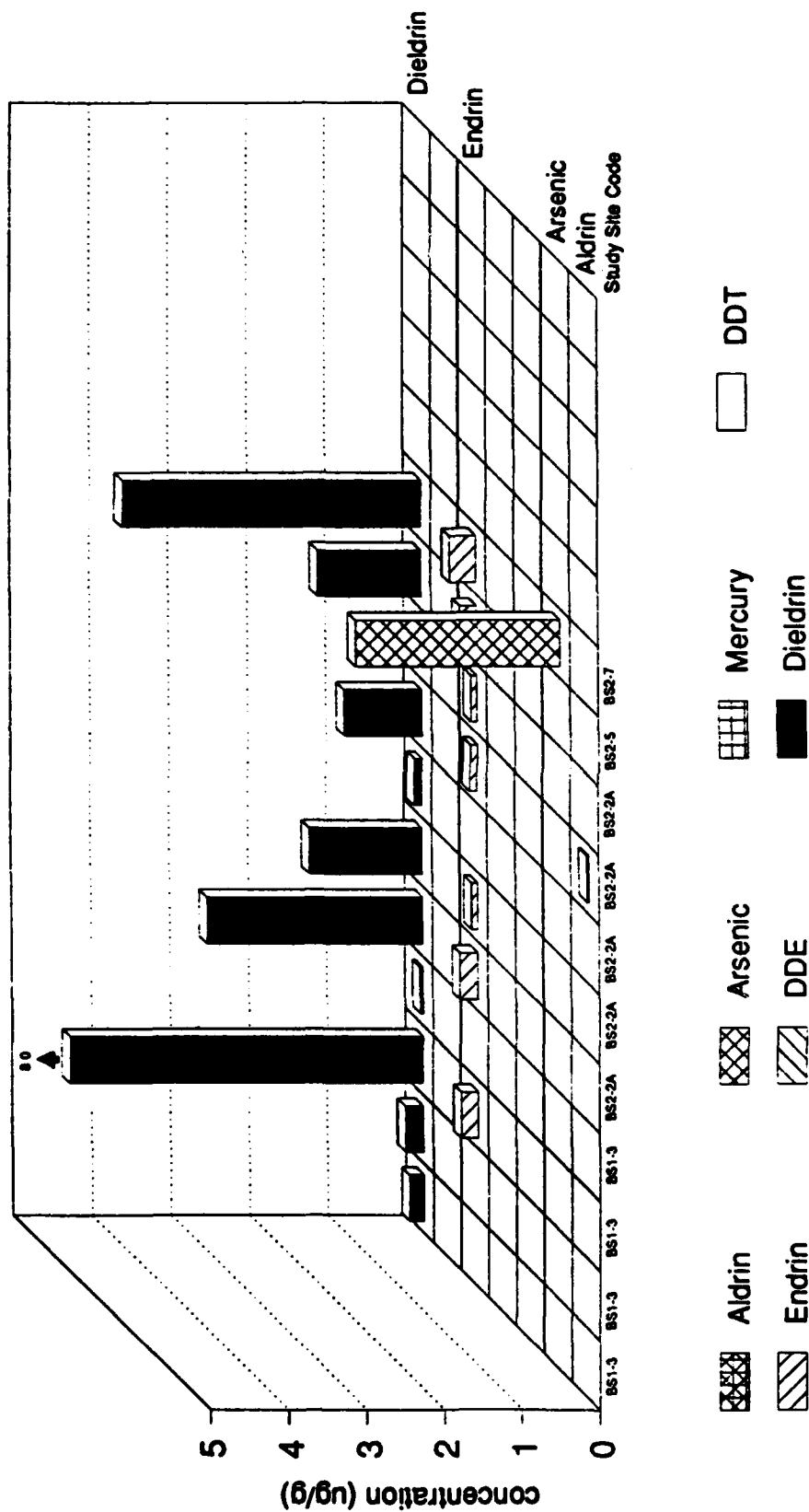
**U. S. Army Program Manager for
Rocky Mountain Arsenal
Commerce City, Colorado**

Prepared by: R.L. Stoller and Associates, Inc.
Ebasco Environmental

Figure 4.1-8

Analyte Concentrations vs. Study Site Pheasant at RMA, 1989

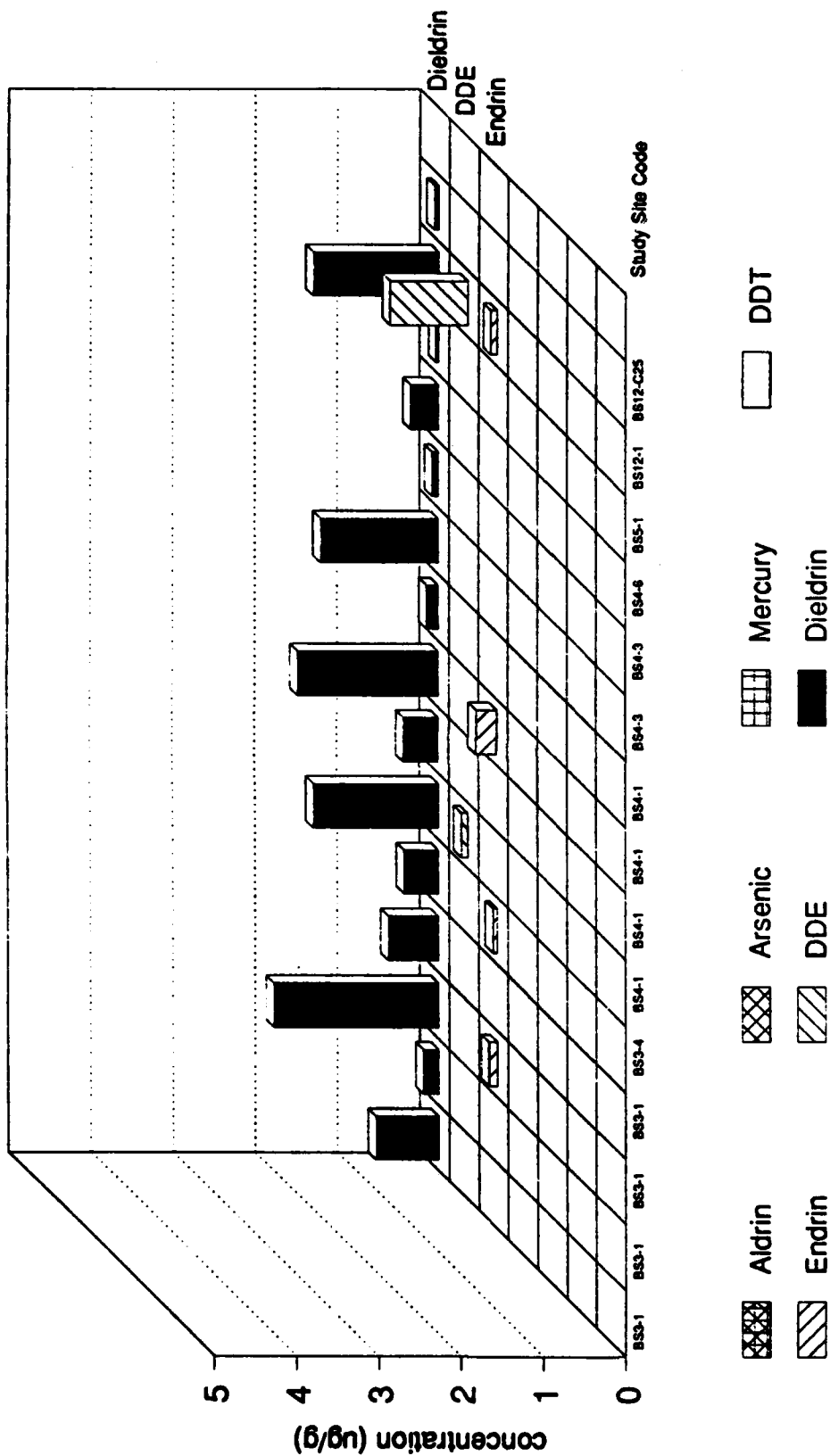
CMP Biota Contamination Assessment
Drafted: 3/22/89



Study sites examined with analyte concentrations below certified reporting limits: See page 2.

Prepared for:
U. S. Army Program Manager for
Rocky Mountain Arsenal
Commerce City, Colorado
Prepared by: R.L. Stollar and Associates, Inc.
Ebasco Environmental

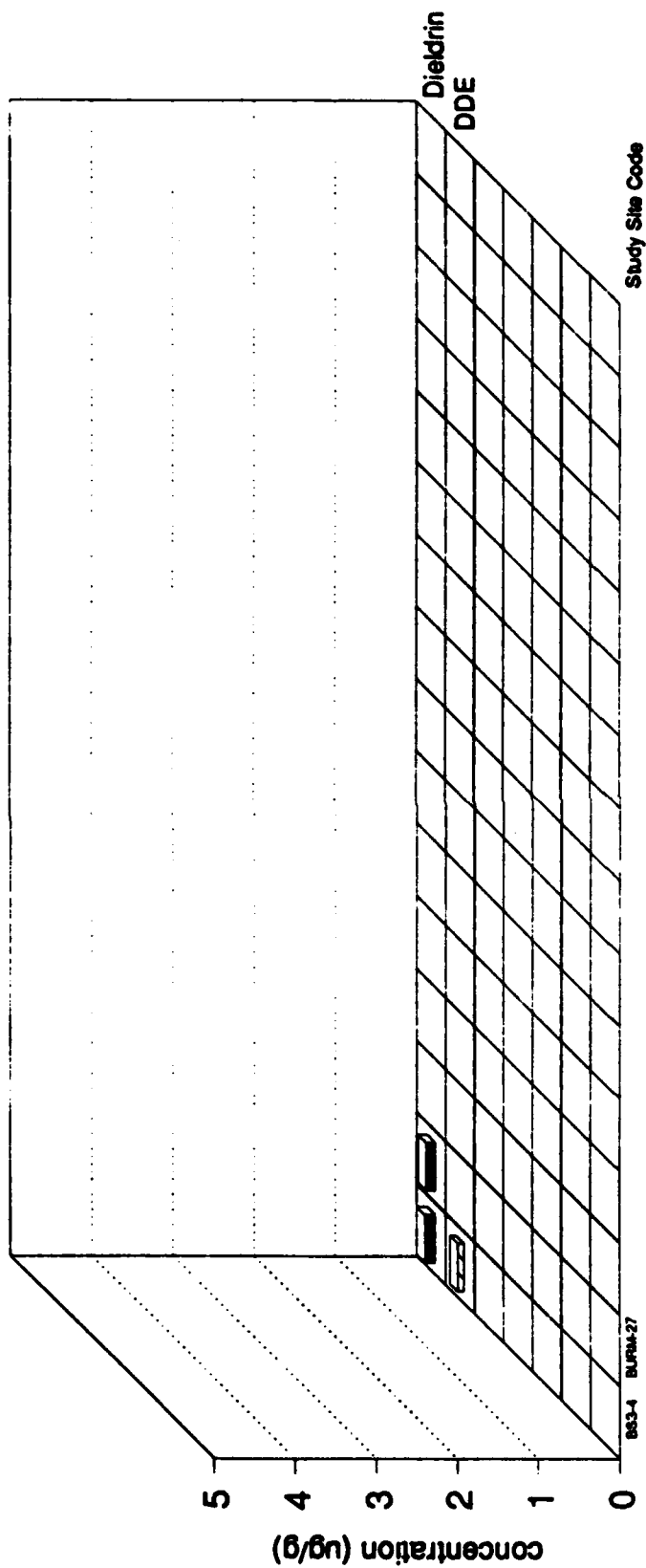
Figure 4.1-9
Analyte Concentrations vs. Study Site
Mourning Dove at RMA, 1989
CMP Biota Contamination Assessment
Drafted: 3/22/89



Study sites examined with analyte concentrations below certified reporting limits: BS4-C1, BS5-5, BS5-5A, BS5-C6, BCDC, BCTR.

Prepared for:
U. S. Army Program Manager for
Rocky Mountain Arsenal
Commerce City, Colorado
Prepared by: R.L. Stollar and Associates, Inc.
Ebasco Environmental

Figure 4.1-9
Analyte Concentrations vs. Study Site
Mourning Dove at RMA, 1989
CMP Biota Contamination Assessment
Drafted: 3/22/89



Study sites examined with analyte concentrations below certified reporting limits: None.

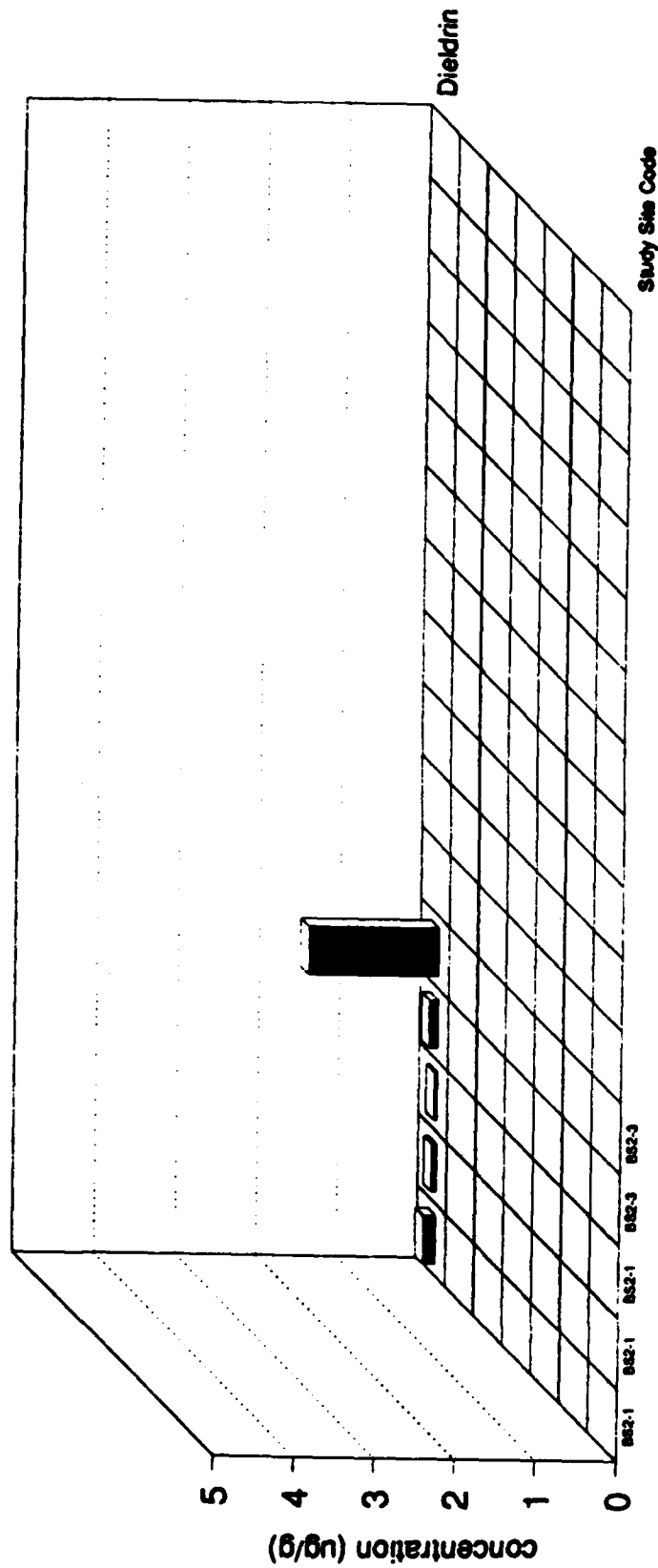
Prepared for:

U. S. Army Program Manager for
Rocky Mountain Arsenal
Commerce City, Colorado
Prepared by: R.L. Stollar and Associates, Inc.
Ebasco Environmental

Figure 4.1-10

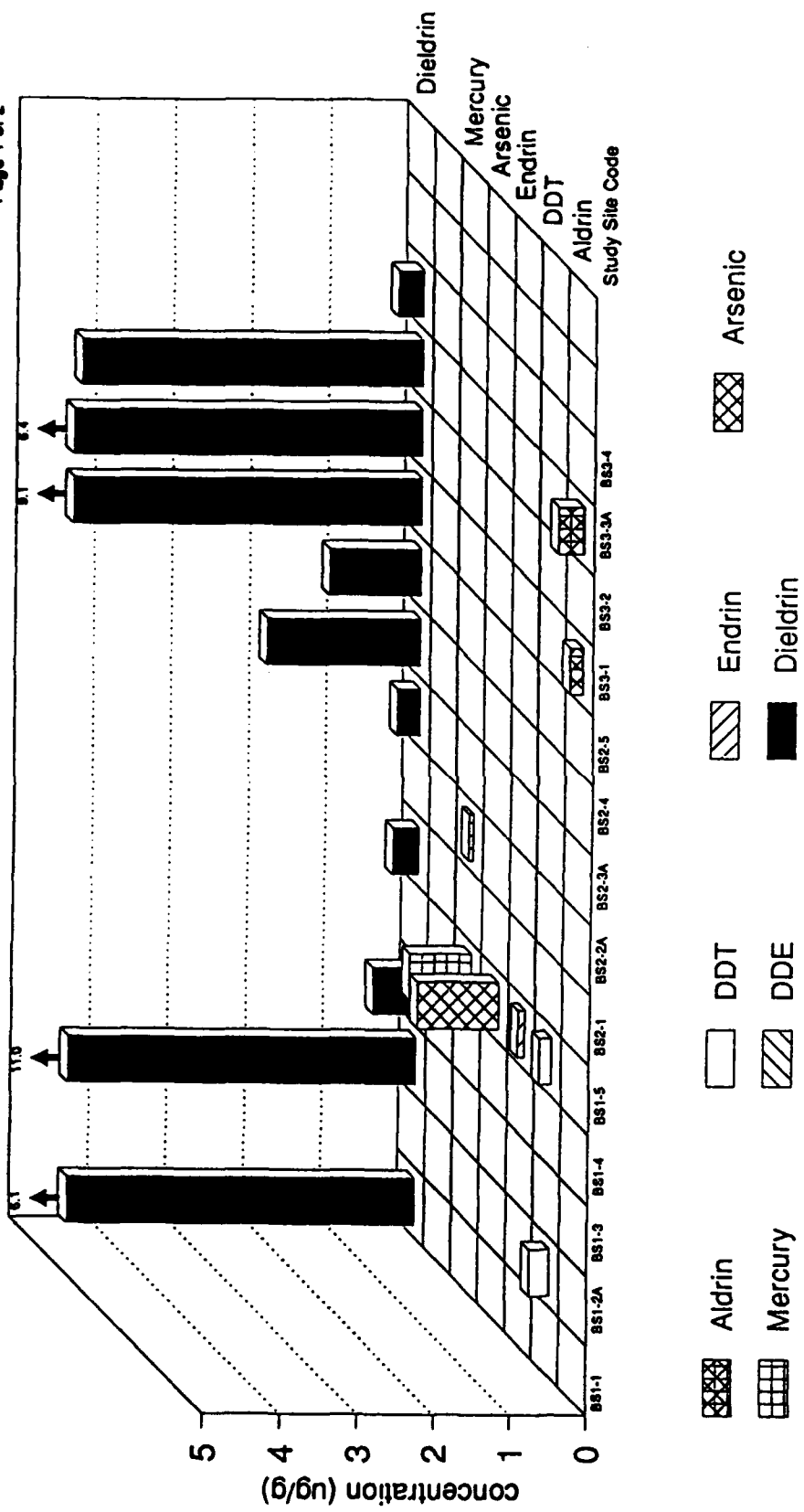
Analyte Concentrations vs. Study Site
Burrowing Owl at RMA, 1989

CMP Biota Contamination Assessment
Drafted: 3/22/89



Study sites examined with analyte concentrations below certified reporting limits: None.

Prepared for: U. S. Army Program Manager for Rocky Mountain Arsenal Commerce City, Colorado Prepared by: R.L. Stollar and Associates, Inc. Ebasco Environmental	Figure 4.1-11 Analyte Concentrations vs. Study Site Western Meadowlark at RMA, 1989 CMP Biota Contamination Assessment Drafted: 3/22/89
--	---



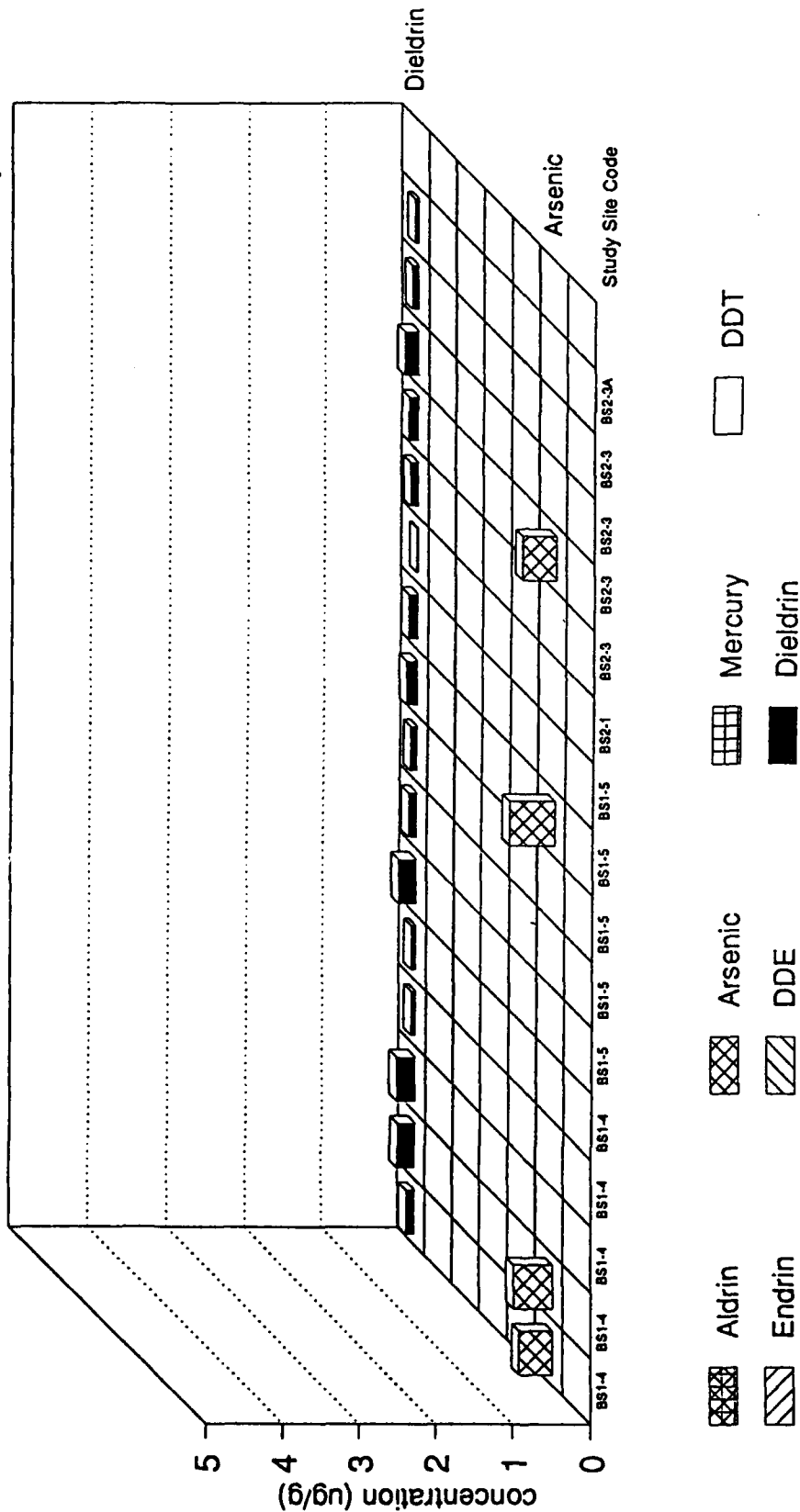
Study sites examined with analyte concentrations below certified reporting limits: See page 2.

Prepared for: U. S. Army Program Manager for Rocky Mountain Arsenal Commerce City, Colorado Prepared by: R.L. Stollar and Associates, Inc. Ebasco Environmental	Figure 4.1-12 Analyte Concentrations vs. Study Site Deer Mouse at RMA, 1989 CMP Biota Contamination Assessment Drafted: 3/22/89
--	---

Study sites examined with analyte concentrations below certified reporting limits: BS5-4, BS5-6, BS11-1, BS11-2, BS11-3, BS12-2, BCRM-1, BCRM-3A, BCRM-4, BCRM-6.

Prepared for:
U. S. Army Program Manager for
Rocky Mountain Arsenal
Commerce City, Colorado
Prepared by: R. L. Stollar and Associates, Inc.
Ebasco Environmental

Figure 4.1-12
Analyte Concentrations vs. Study Site
Deer Mouse at RMA, 1989
CMP Biota Contamination Assessment
Dated: 3/22/89



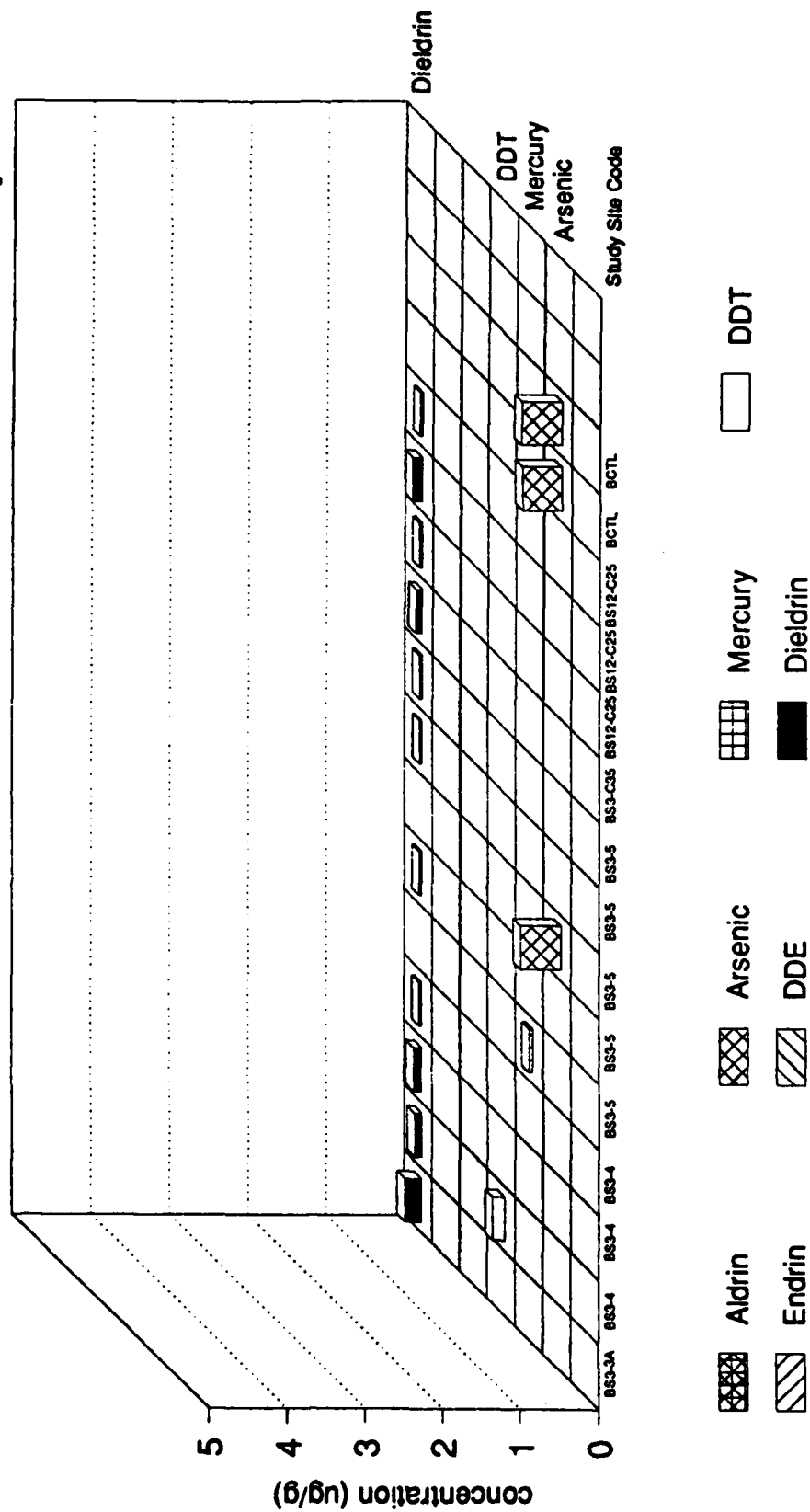
Study sites examined with analyte concentrations below certified reporting limits: See page 2.

Prepared for:

U. S. Army Program Manager for
Rocky Mountain Arsenal
Commerce City, Colorado
Prepared by: R.L. Stollar and Associates, Inc.
Ebasco Environmental

Figure 4.1-13

Analyte Concentrations vs. Study Site
Prairie Dog at RMA, 1989
CMP Biota Contamination Assessment
Dated: 3/22/89



Study sites examined with analyte concentrations below certified reporting limits: BS11-C32.

Figure 4.1-13

Analyte Concentrations vs. Study Site Prairie Dog at RMA, 1989

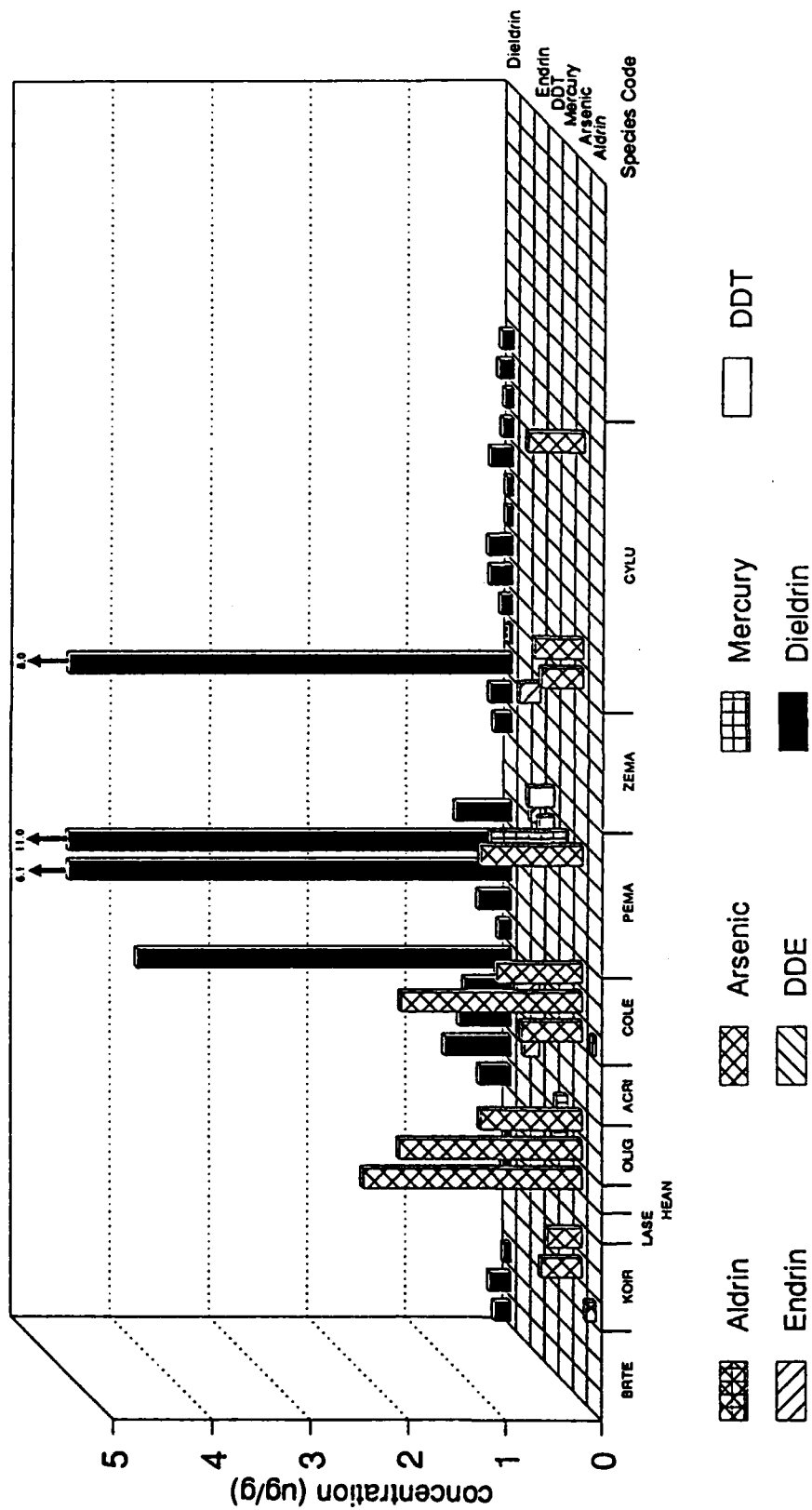
CMP Biota Contamination Assessment

Drafted: 3/22/89

Prepared for:

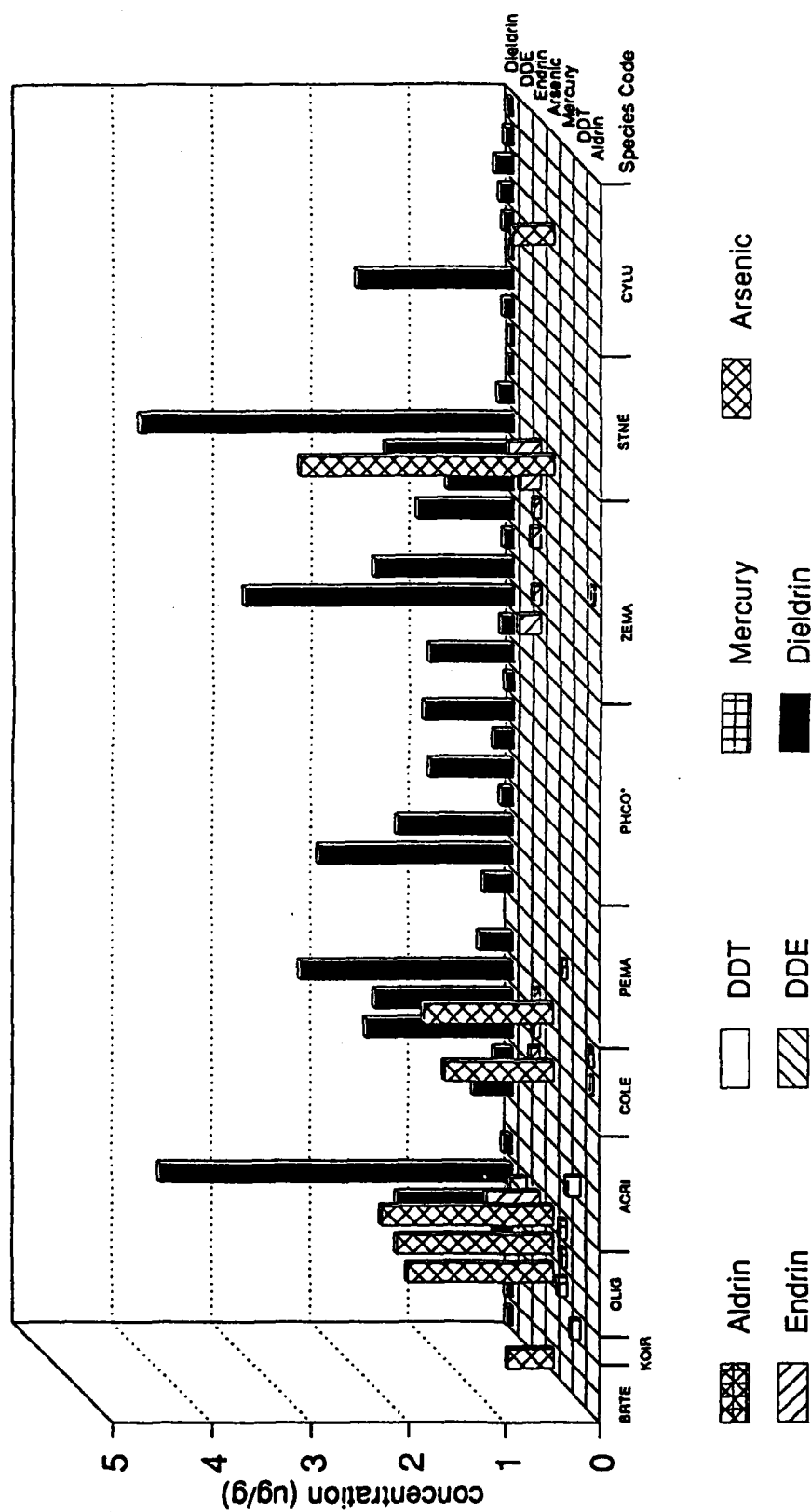
**U. S. Army Program Manager for
Rocky Mountain Arsenal
Commerce City, Colorado**

Prepared by: **R.L. Stollar and Associates, Inc.**
Ebasco Environmental



Prepared for:

U. S. Army Program Manager for
Rocky Mountain Arsenal
Commerce City, Colorado
Prepared by: R.L. Stollar and Associates, Inc.
Ebasco Environmental



Species examined with analyte concentrations below certified reporting limits: None.

*Mercury analysis results were not received for two samples.

Prepared for:

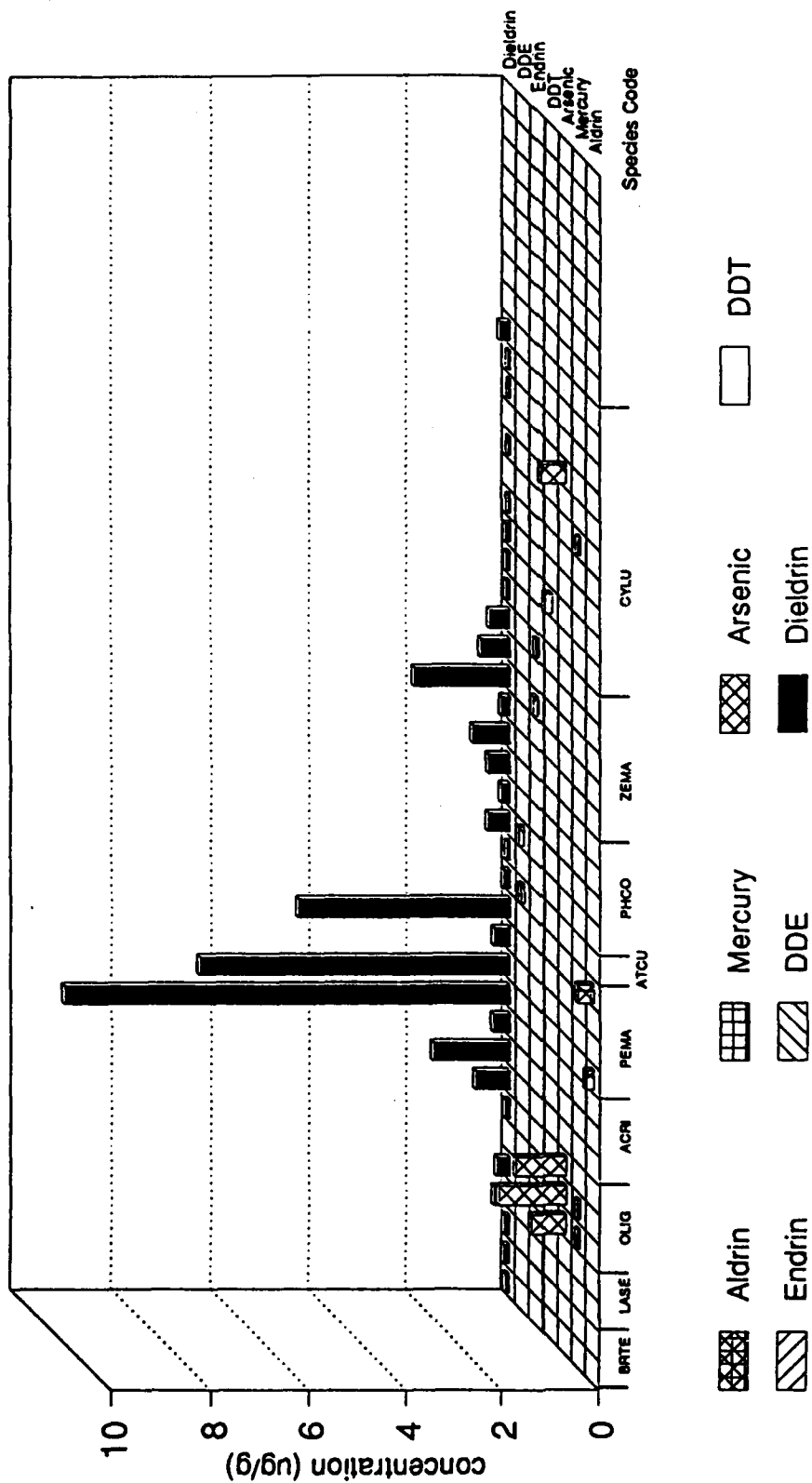
U. S. Army Program Manager for
Rocky Mountain Arsenal
Commerce City, Colorado

Prepared by: R.L. Stollar and Associates, Inc.
Ebasco Environmental

Figure 4.1-15

Analyte Concentrations vs. Species
BSA 2, Basin F and Vicinity, 1989

CMP Biota Contamination Assessment
Drafted: 3/22/89



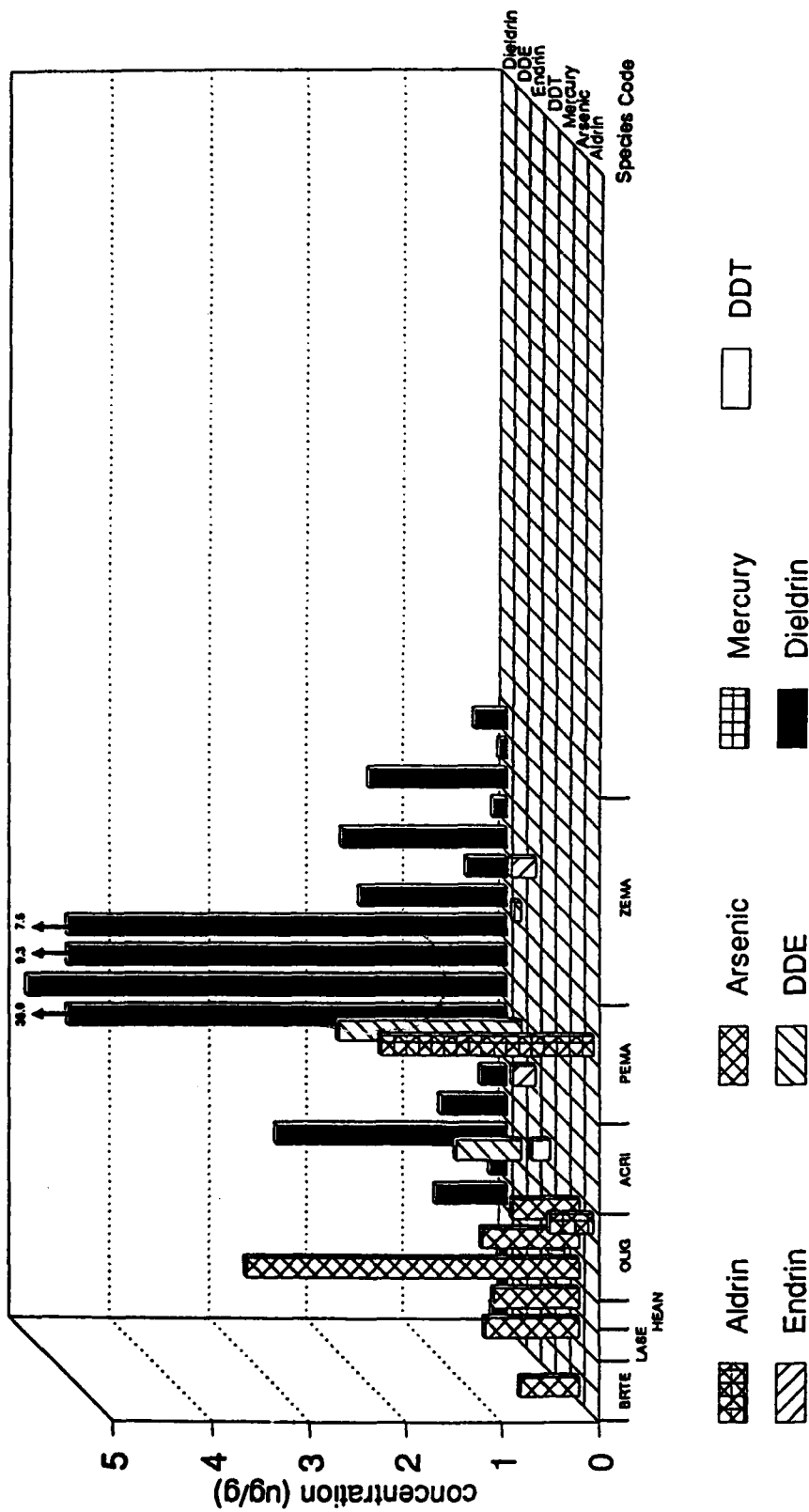
Species examined with analyte concentrations below certified reporting limits: None.

Prepared for:

U. S. Army Program Manager for
Rocky Mountain Arsenal
Commerce City, Colorado
Prepared by: R.L. Stollar and Associates, Inc.
Ebasco Environmental

Figure 4.1-16

Analyte Concentrations vs. Species
BSA 3, Sand Creek Lateral and Vicinity, 1989
CMP Biota Contamination Assessment
Dated: 3/22/89



Prepared for:

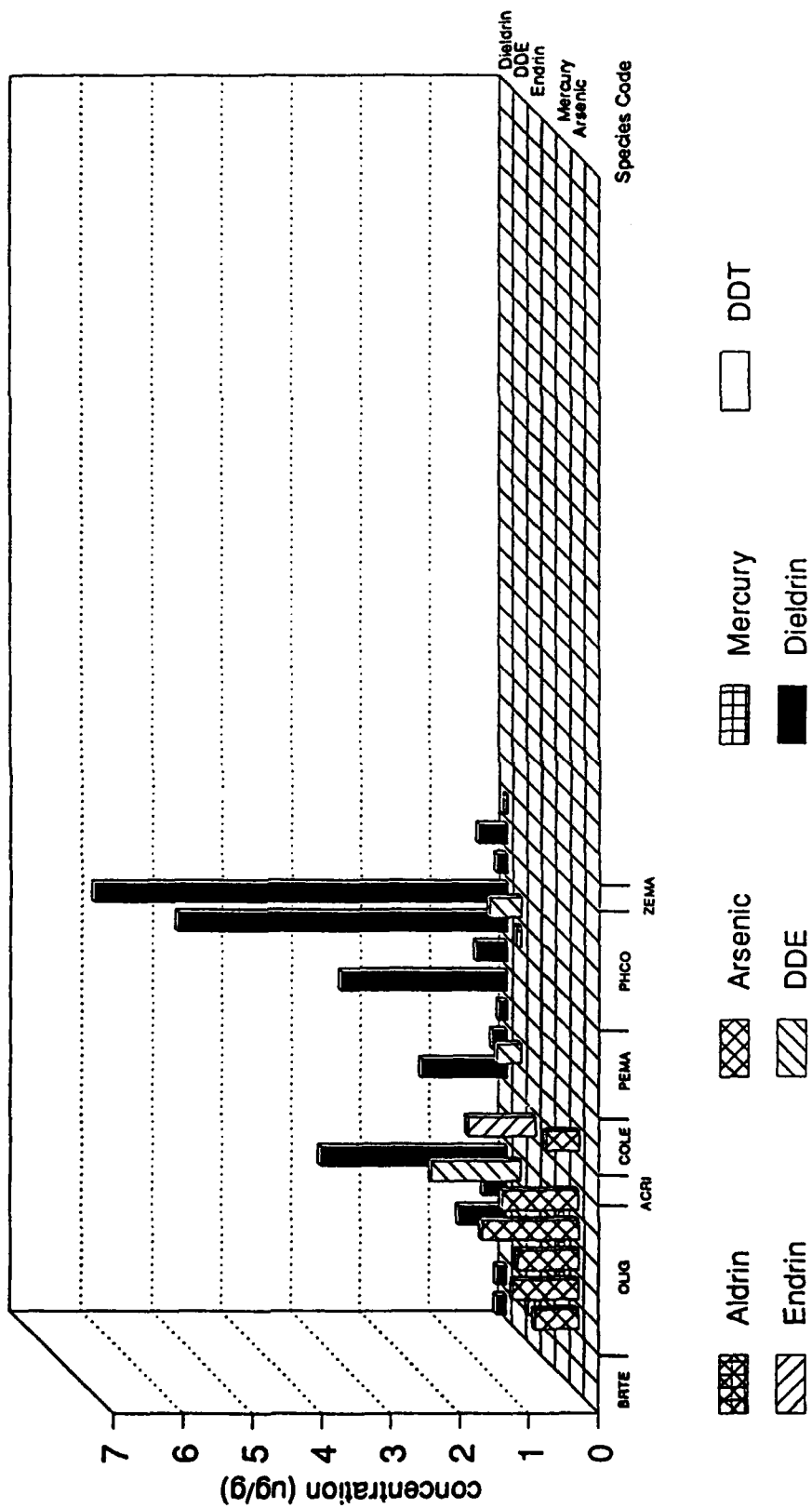
U. S. Army Program Manager for
Rocky Mountain Arsenal
Commerce City, Colorado
Prepared by: R.L. Stollar and Associates, Inc.
Ebasco Environmental

Figure 4.1-17

Analyte Concentrations vs. Species
BSA 4, South Plants Complex, 1989

CMP Biota Contamination Assessment

Drafted: 3/22/89



Prepared for:

U. S. Army Program Manager for
Rocky Mountain Arsenal
Commerce City, Colorado
Prepared by: R.L. Stollar and Associates, Inc.
Ebasco Environmental

Figure 4.1-18

Analyte Concentrations vs. Species
BSA 5, Terrestrial Lower Lakes Region, 1989
CMP Biota Contamination Assessment
Drafted: 3/22/89

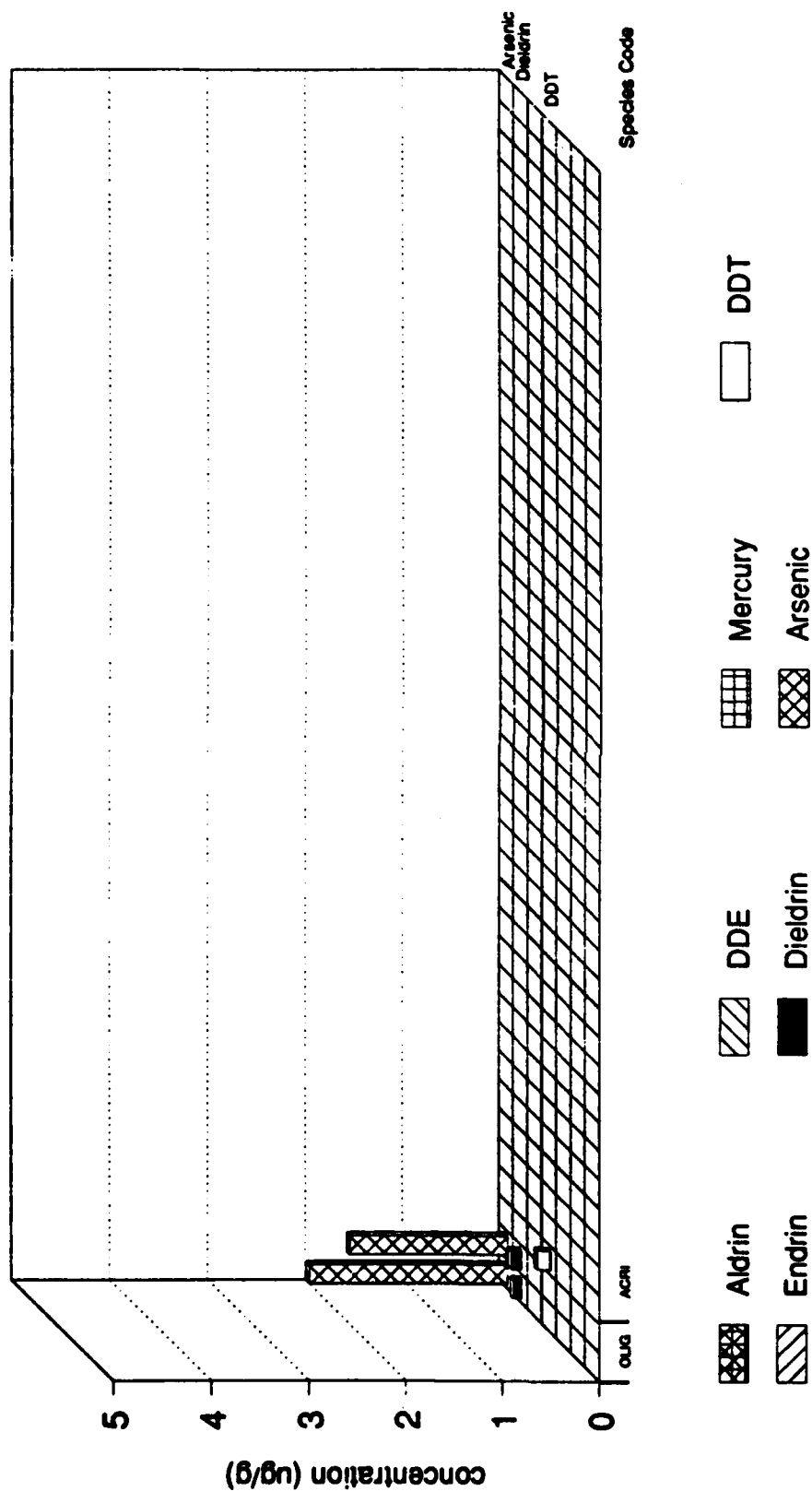
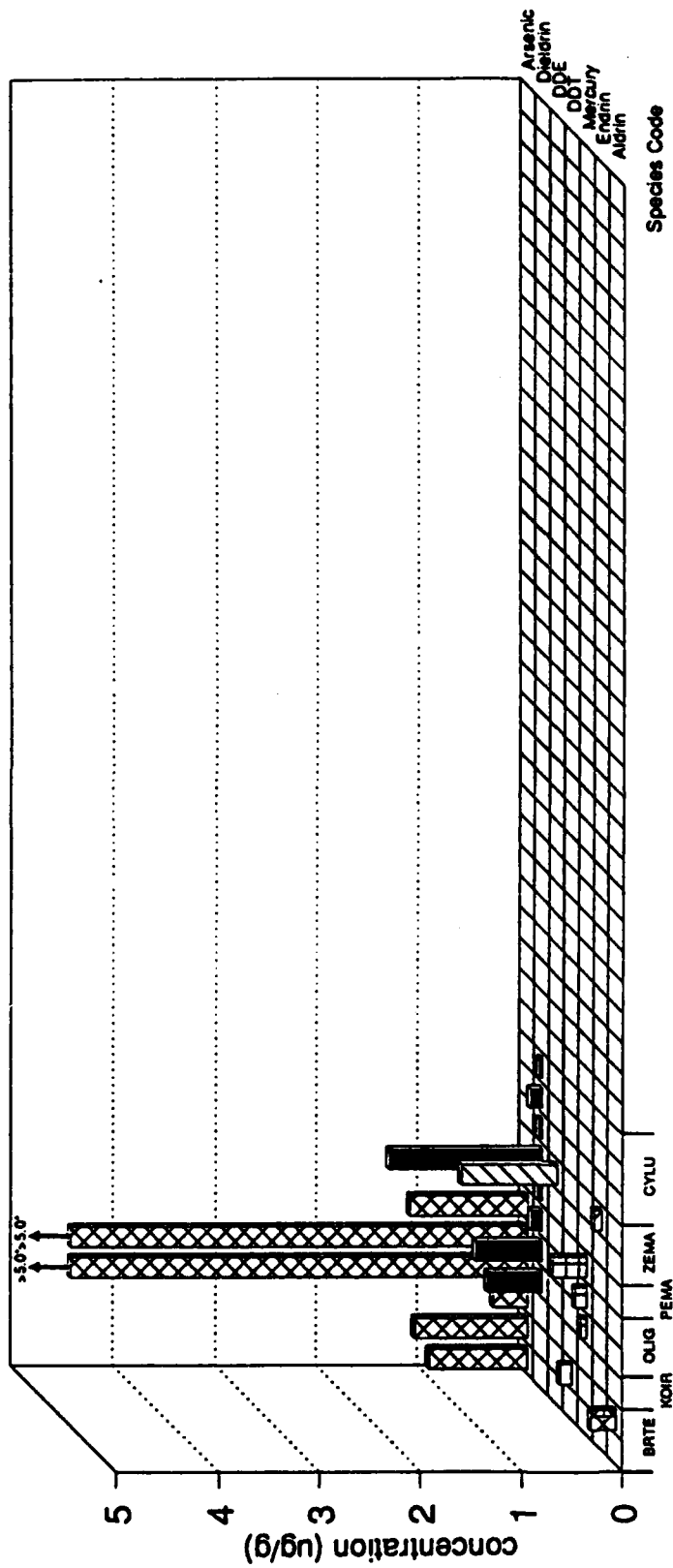



Figure 4.1-19
 Analyte Concentrations vs. Species
 BSA 11, Toxic Storage Yard, 1989
 CMP Biota Contamination Assessment
 Drafted: 3/22/89

Prepared for:
 U. S. Army Program Manager for
 Rocky Mountain Arsenal
 Commerce City, Colorado
 Prepared by: R.L. Stollar and Associates, Inc.
 Ebasco Environmental



Species Code

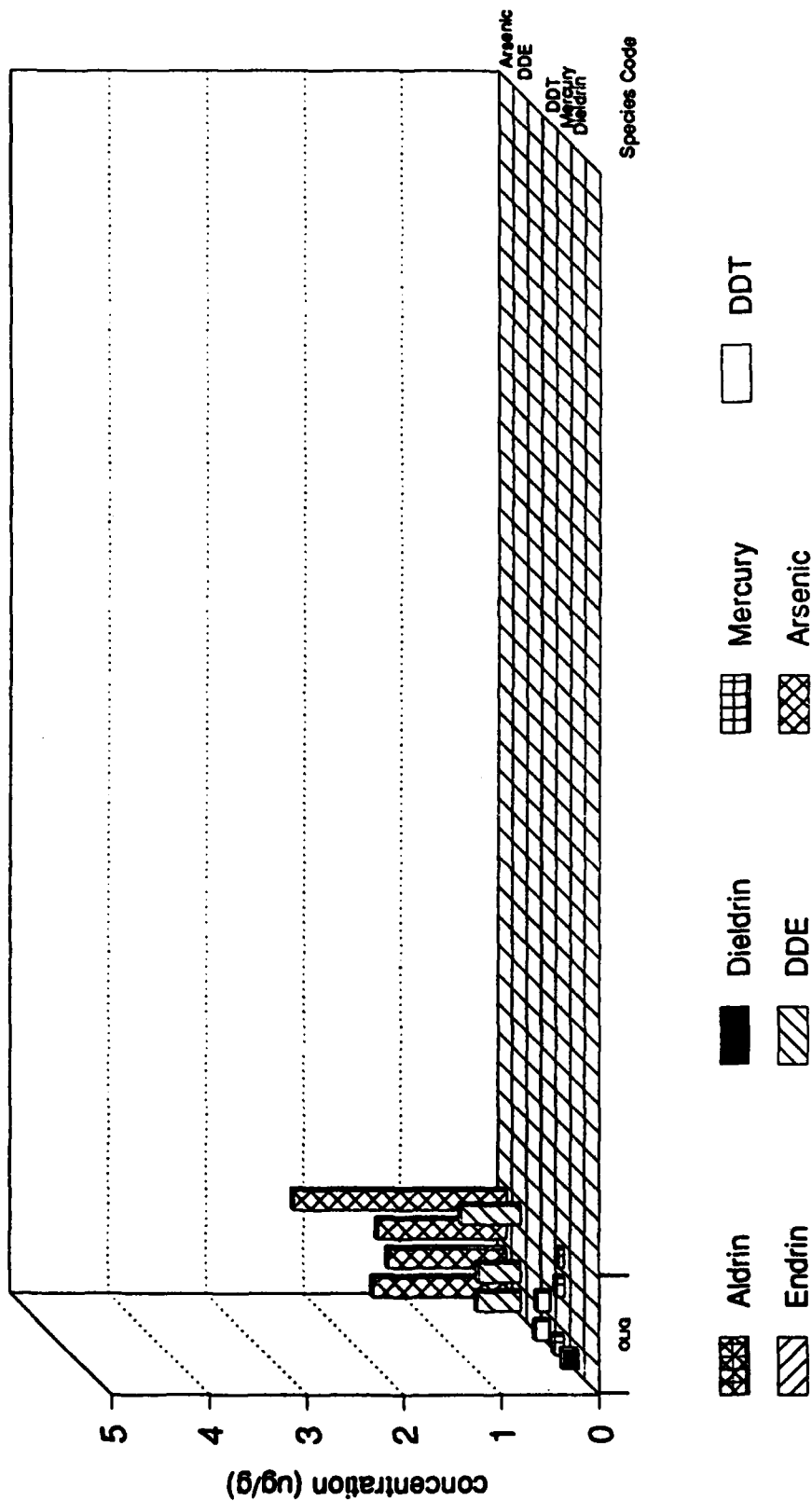
Aldrin  Aldrin  Endrin  Mercury  DDT
 DDE  DDE  Dieldrin  Arsenic

Species examined with analyte concentrations below certified reporting limits: None.

*Arsenic concentrations > upper certified reporting limit for two samples.

Prepared for:
 U. S. Army Program Manager for
 Rocky Mountain Arsenal
 Commerce City, Colorado
 Prepared by: R. L. Stollar and Associates, Inc.
 Ebasco Environmental

Figure 4.1-20
 Analyte Concentrations vs. Species
 BSA 12, North Plants, 1989
 CMP Biota Contamination Assessment
 Drafted: 3/22/89



Prepared for:

U. S. Army Program Manager for
Rocky Mountain Arsenal
Commerce City, Colorado

Prepared by: R.L. Stollar and Associates, Inc.
Ebasco Environmental

Figure 4.1-21

Analyte Concentrations vs. Species
BSA 13, Administration Bldg. Vicinity, 1989

CMP Biota Contamination Assessment

Drafted: 3/22/89

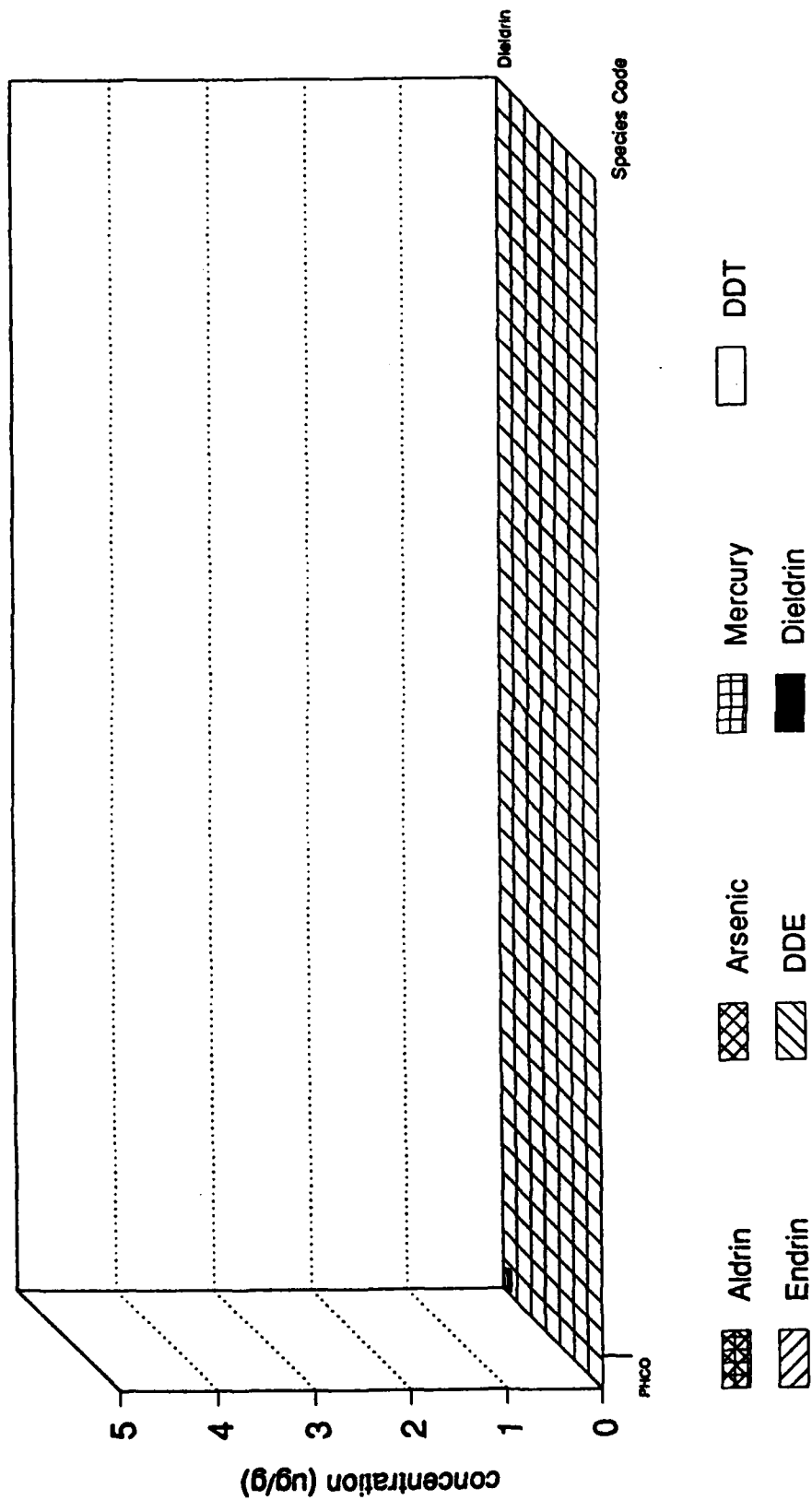
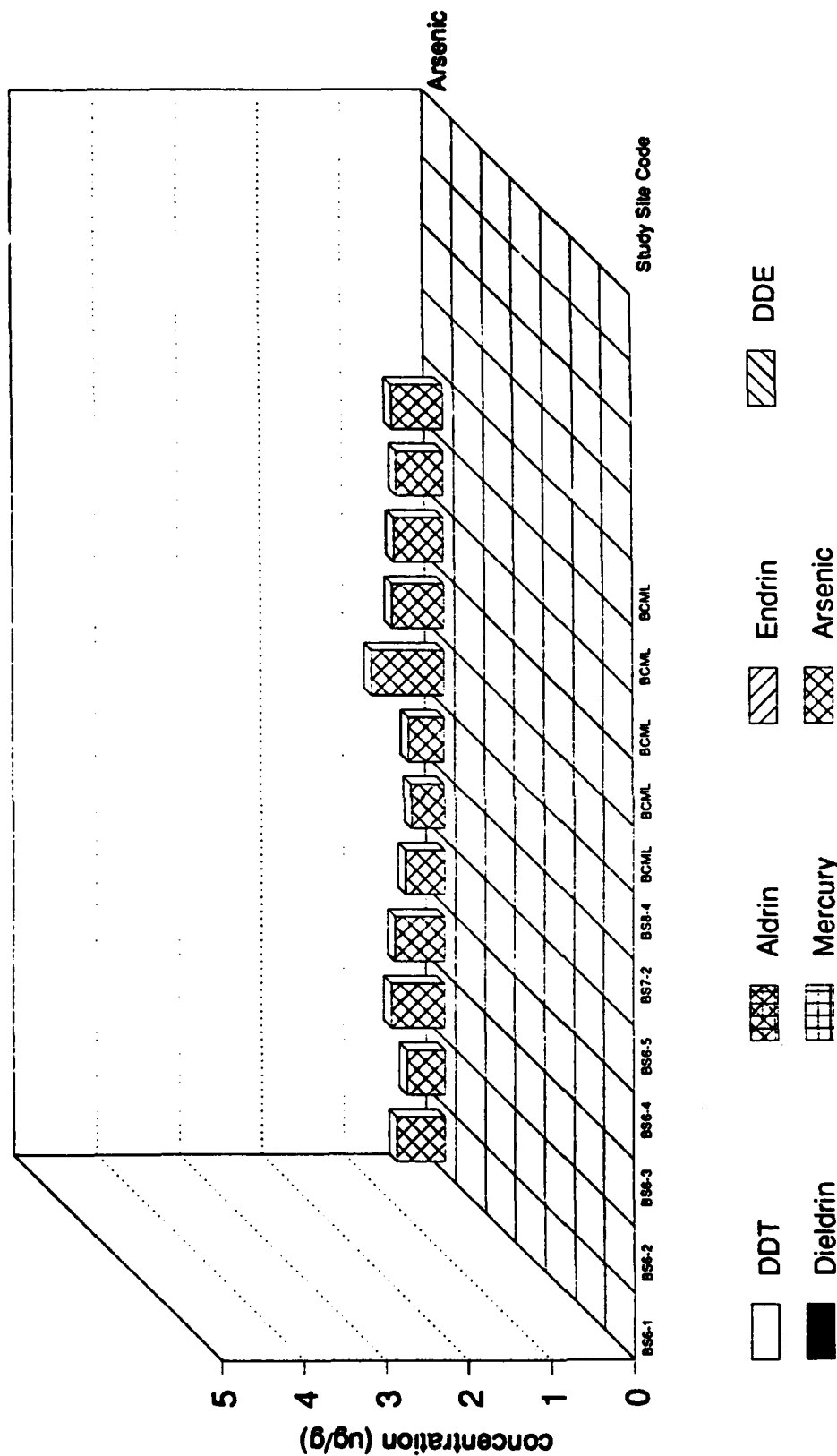


Figure 4.1-22
 Analyte Concentrations vs. Species
 Near Sites at RMA, 1989
 CMP Biota Contamination Assessment
 Drafted: 3/22/89

Prepared for:
 U. S. Army Program Manager for
 Rocky Mountain Arsenal
 Commerce City, Colorado
 Prepared by: R.L. Stollar and Associates, Inc.
 Ebasco Environmental



Sites examined with analyte concentrations below certified reporting limits: BS7-1, BS7-3, BS7-4, BS7-5, BS8-1, BS8-2, BS8-3, BS8-5.

Sample analysis for OCP's has been delayed pending completion of laboratory certification.

Prepared for:

U. S. Army Program Manager for
Rocky Mountain Arsenal
Commerce City, Colorado
Prepared by: R.L. Stolar and Associates, Inc.
Ebasco Environmental

Figure 4.2-1

Analyte Concentrations vs. Study Site
Plankton at RMA, 1989

CMP Biota Contamination Assessment
Drafted: 3/22/89



Prepared for:

**U. S. Army Program Manager for
Rocky Mountain Arsenal
Commerce City, Colorado**

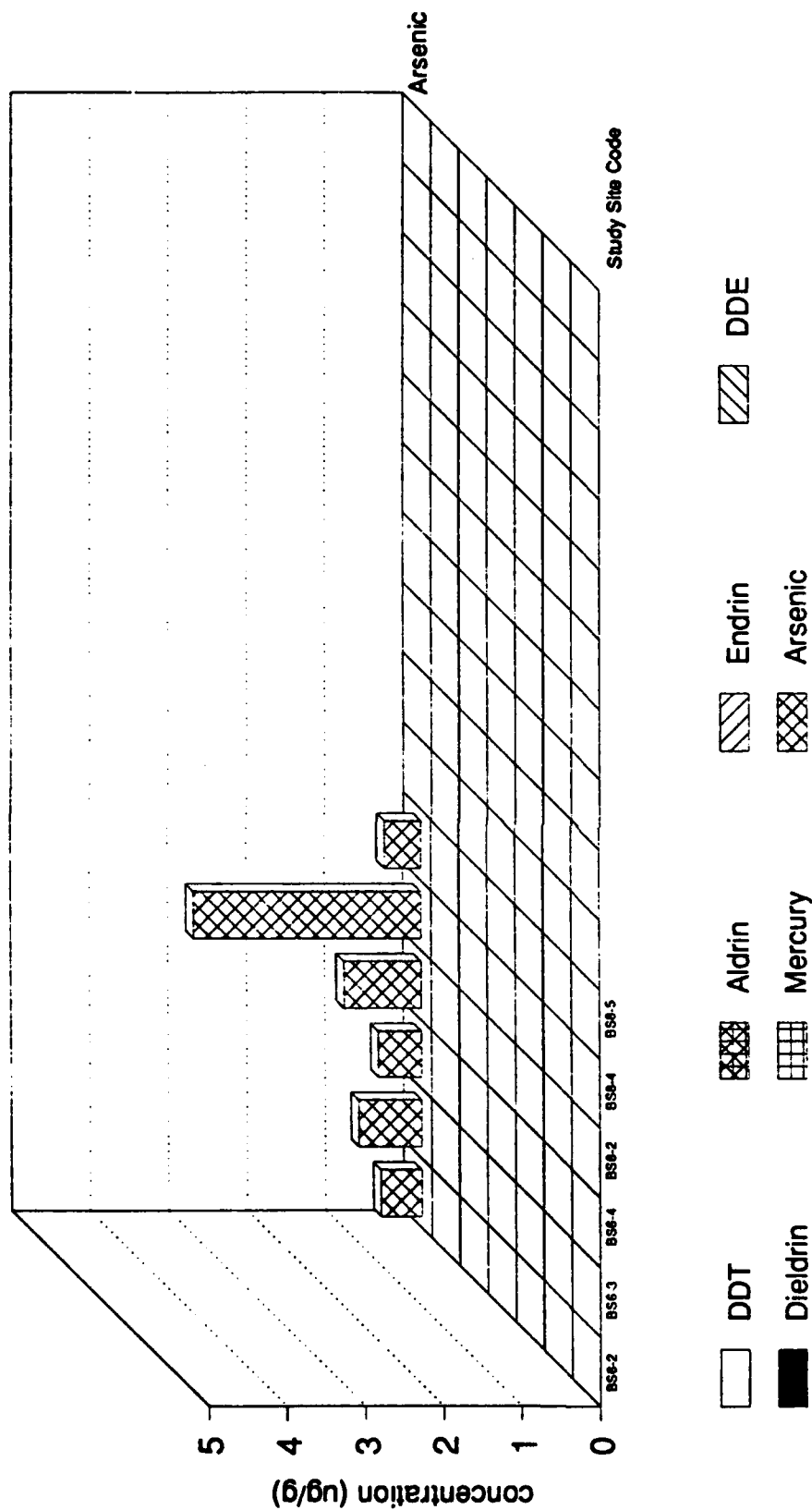
**Prepared by: R.L. Stollar and Associates, Inc.
Ebasco Environmental**

Figure 4.2-2

Analyte Concentrations vs. Study Site American Pondweed at RMA, 1989

CMP Biota Contamination Assessment

Drahted: 3/22/89



Sites examined with analyte concentrations below certified reporting limits:
BS7-1, BS7-4, BS7-5, BCSP, BCWP.

Sample analysis for OCP's has been delayed pending completion of laboratory certification.

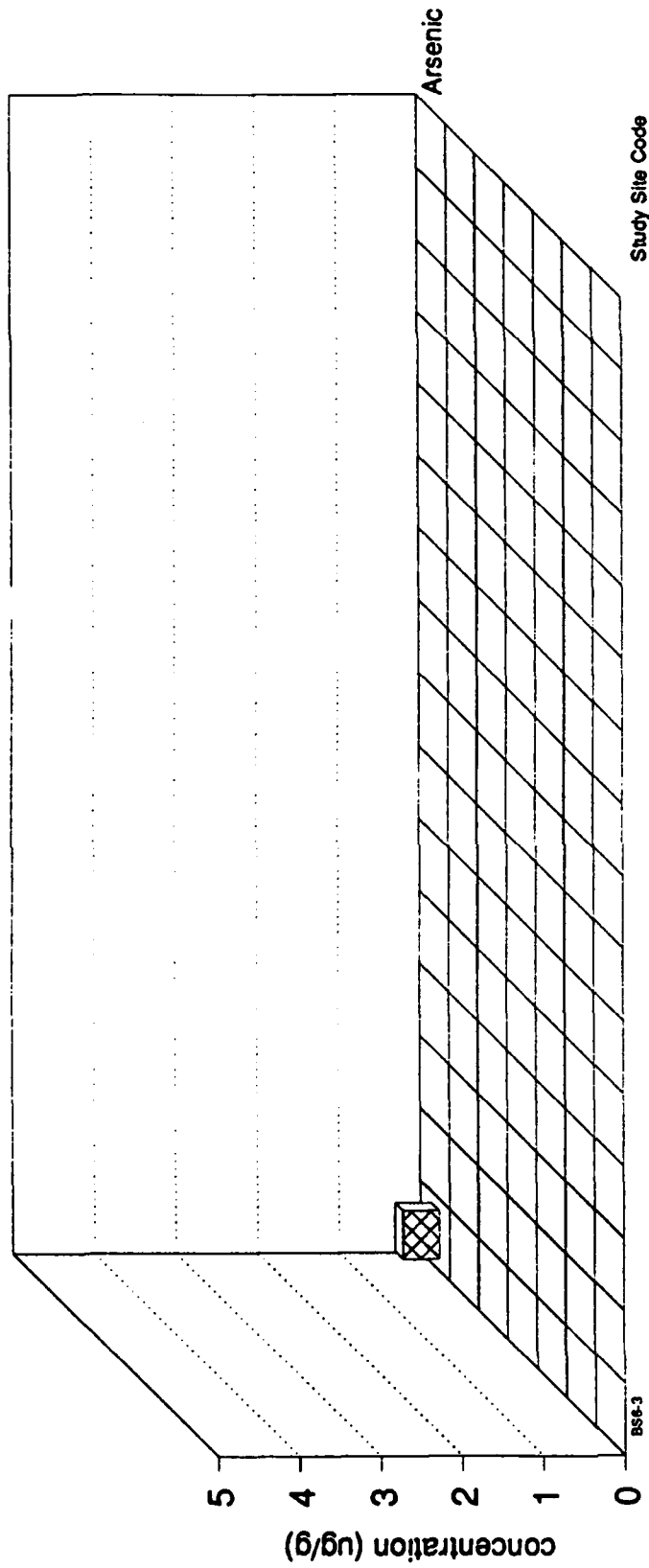
Prepared for:

U. S. Army Program Manager for
Rocky Mountain Arsenal
Commerce City, Colorado
Prepared by: R.L. Stollar and Associates, Inc.
Ebasco Environmental

Figure 4.2-3

Analyte Concentrations vs. Study Site
Sego Pondweed at RMA, 1989

CMP Biota Contamination Assessment
Drafted: 3/22/89



Sites examined with analyte concentrations below certified reporting limits: BS6-2, BS6-5, BS7-3, BS7-4, BS7-5.

Sample analysis for OCP's has been delayed pending completion of laboratory certification.

Prepared for:

U. S. Army Program Manager for
Rocky Mountain Arsenal
Commerce City, Colorado

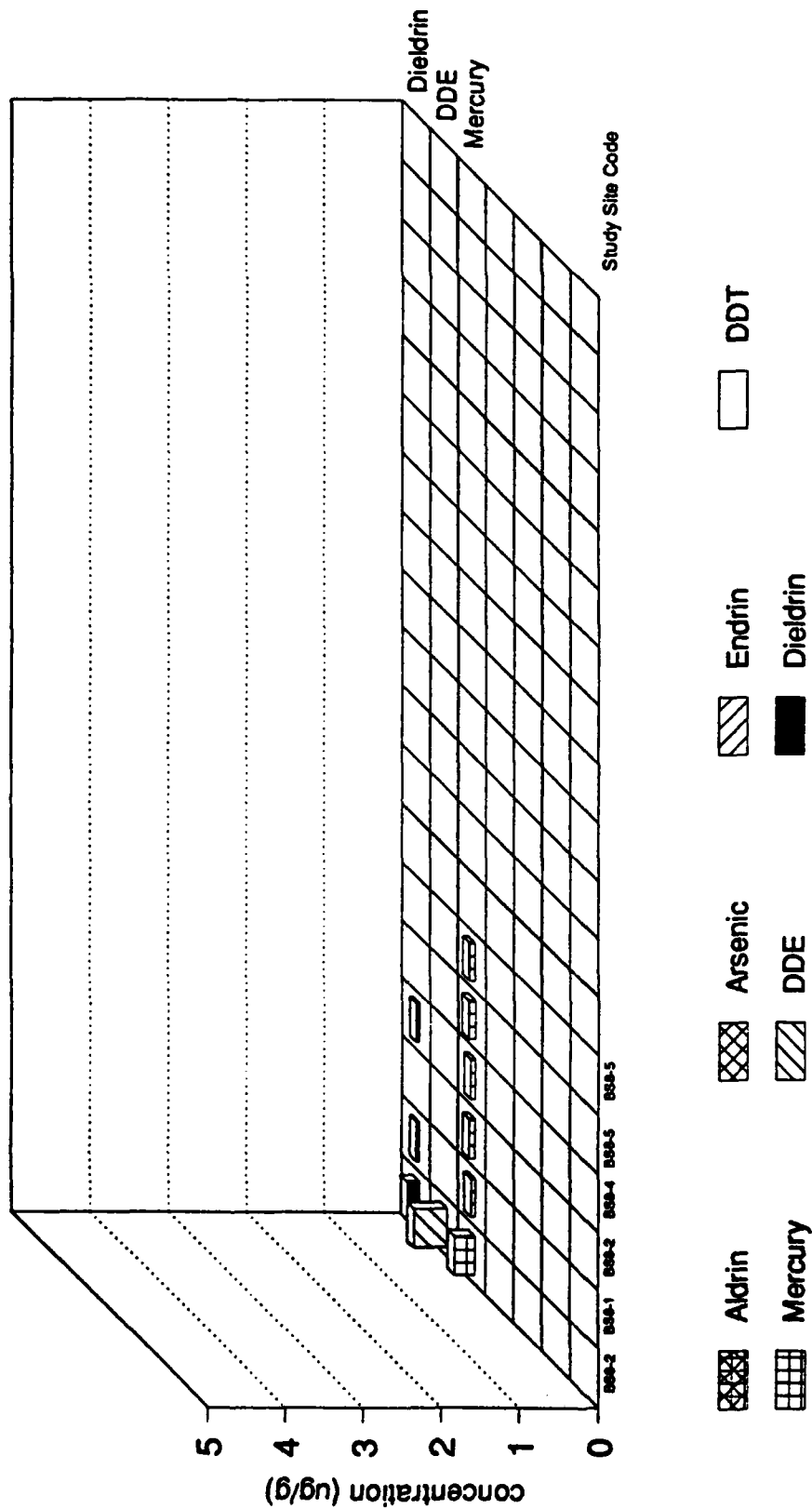
Prepared by: R.L. Stollar and Associates, Inc.
Ebasco Environmental

Figure 4.2-4

Analyte Concentrations vs. Study Site
Coontail at RMA, 1989

CMP Biota Contamination Assessment

Drafted: 3/22/89



Study sites examined with analyte concentrations below certified reporting limits: BCWP.

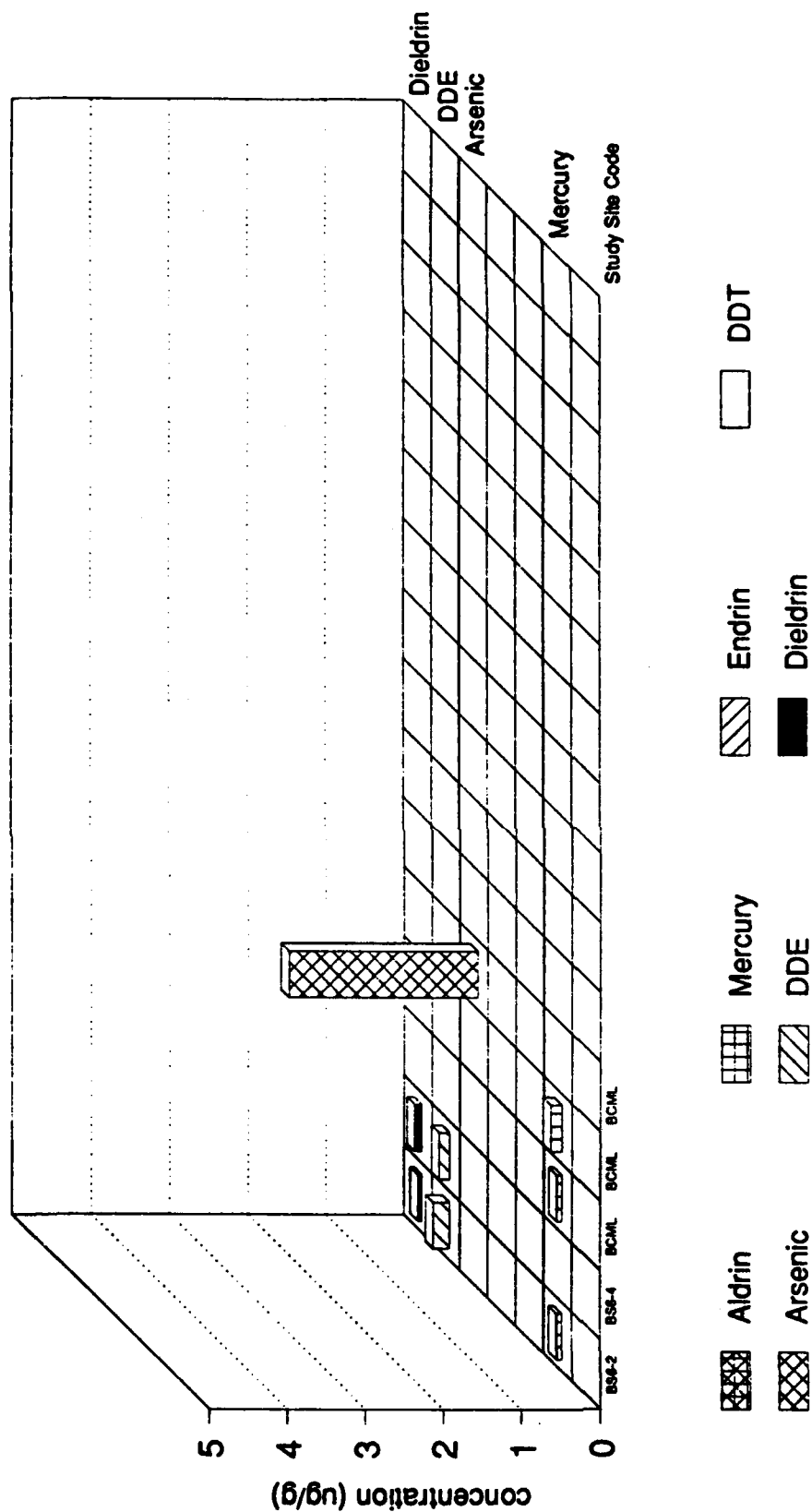
Prepared for:

U. S. Army Program Manager for
Rocky Mountain Arsenal
Commerce City, Colorado
Prepared by: R.L. Stollar and Associates, Inc.
Ebasco Environmental

Figure 4.2-5

Analyte Concentrations vs. Study Site
Bullhead at RMA, 1989

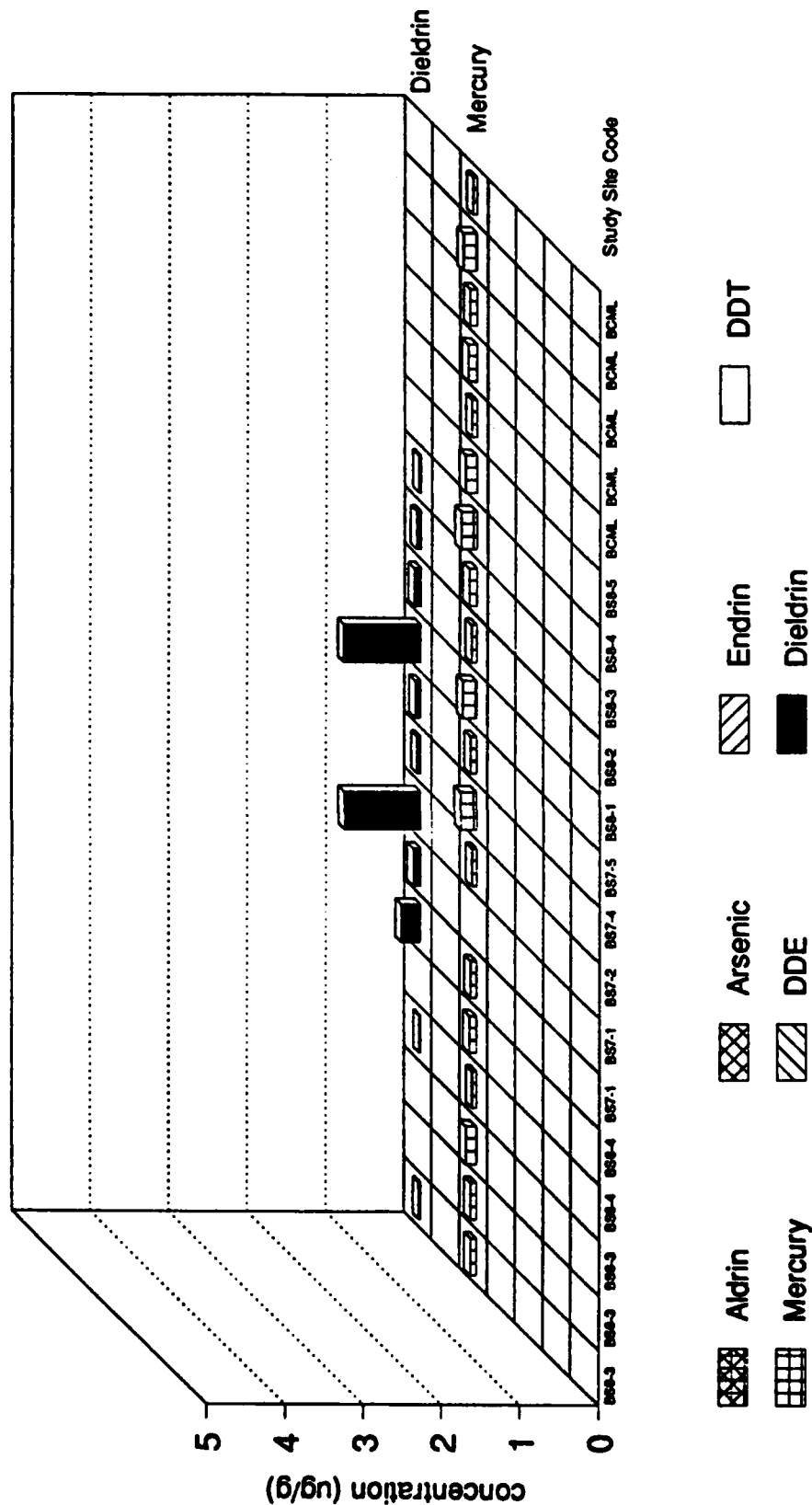
CMP Biota Contamination Assessment
Drafted: 3/22/89



Study sites examined with analyte concentrations below certified reporting limits: None.

Figure 4.2-6
Analyte Concentrations vs. Study Site
Catfish at RMA, 1989
CMP Biota Contamination Assessment
Drafted: 3/22/89

Prepared for:
U. S. Army Program Manager for
Rocky Mountain Arsenal
Commerce City, Colorado
Prepared by: R.L. Stollar and Associates, Inc.
Ebasco Environmental



Study sites examined with analyte concentrations below certified reporting limits: None.

Prepared for:

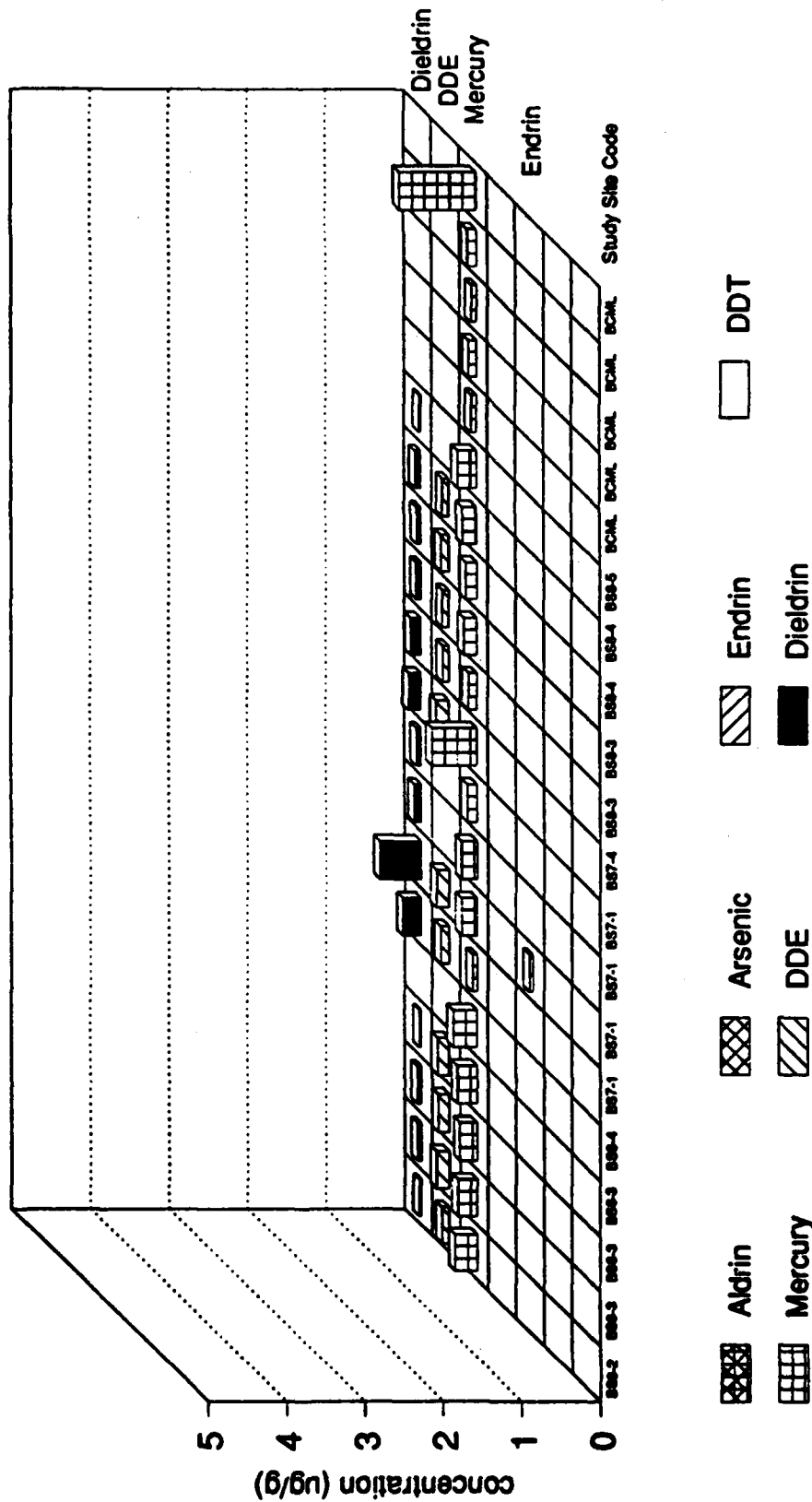
U. S. Army Program Manager for
Rocky Mountain Arsenal
Commerce City, Colorado

Prepared by: R.L. Stollar and Associates, Inc.
Ebasco Environmental

Figure 4.2-7

Analyte Concentrations vs. Study Site
Bluegill at RMA, 1989

CMP Biota Contamination Assessment
Drafted: 3/22/89



Study sites examined with analyte concentrations below certified reporting limits: None.

Prepared for:

U. S. Army Program Manager for
Rocky Mountain Arsenal
Commerce City, Colorado

Prepared by: R.L. Stollar and Associates, Inc.
Ebasco Environmental

Figure 4.2-8

Analyte Concentrations vs. Study Site
Bass at RMA, 1989

CMP Biota Contamination Assessment
Drafted: 3/22/89

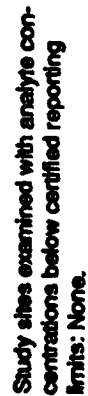
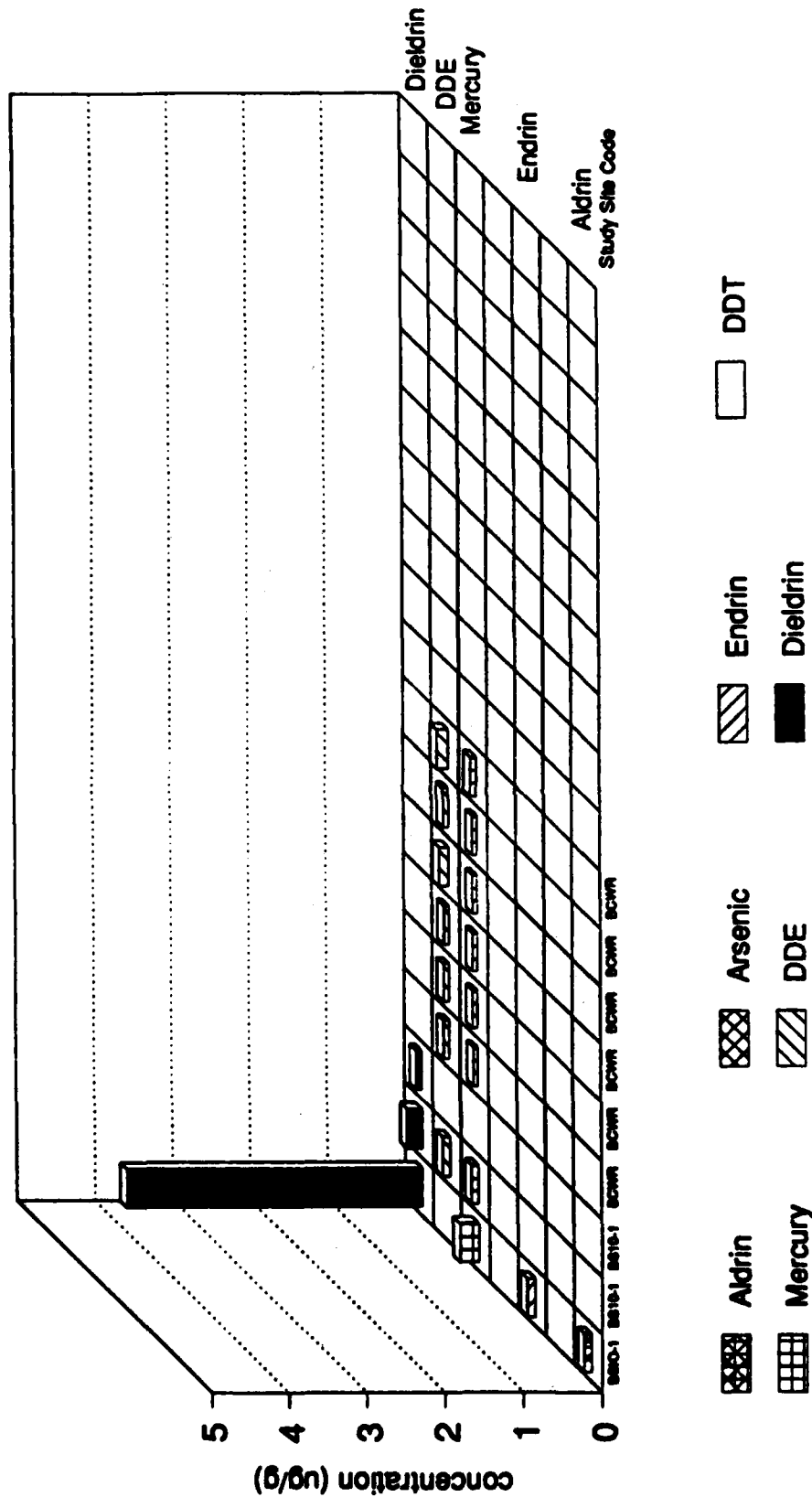


Figure 4.2-9
Analyte Concentrations vs. Study Site
Northern Pike at RMA, 1989
CMP Biota Contamination Assessment
Drafted: 3/22/89



Study sites examined with analyte concentrations below certified reporting limits: None.

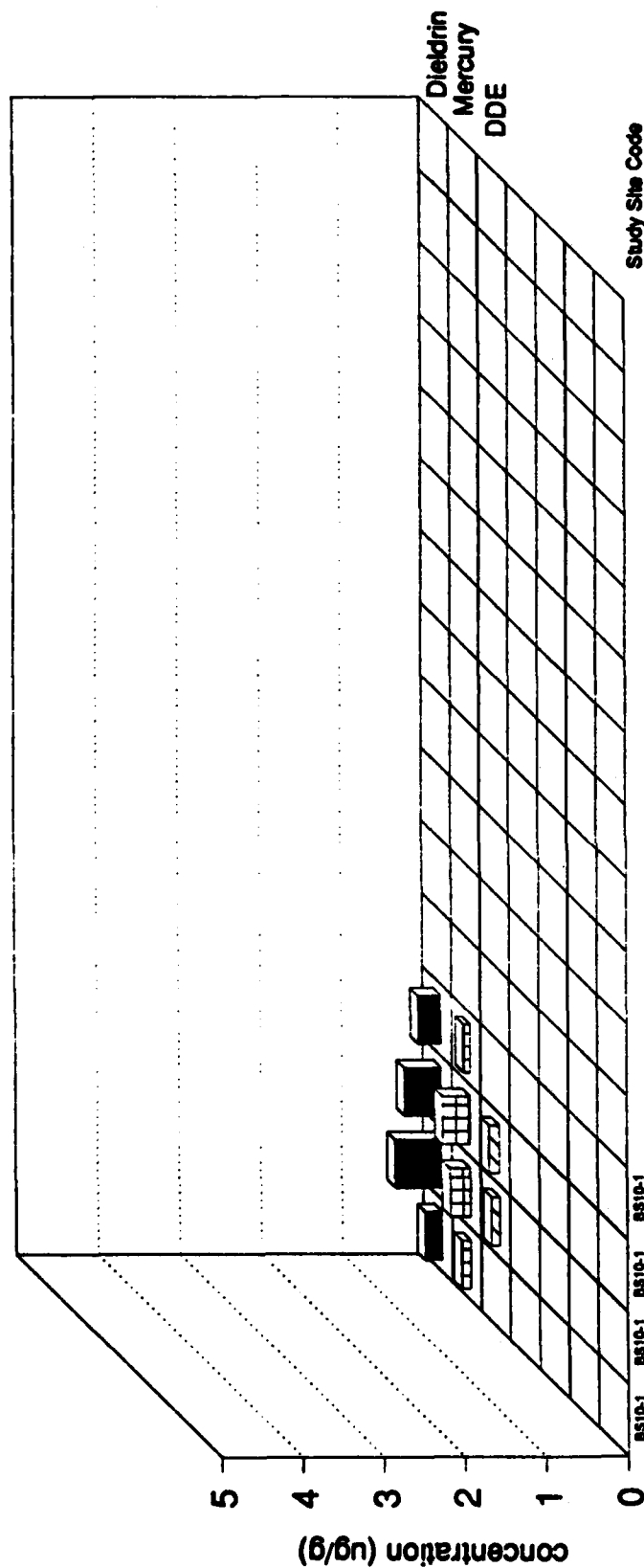
Prepared for:

U. S. Army Program Manager for
Rocky Mountain Arsenal
Commerce City, Colorado
Prepared by: R. L. Stollar and Associates, Inc.
Ebasco Environmental

Figure 4.2-10

Analyte Concentrations vs. Study Site
Mallard at RMA, 1989

CMP Biota Contamination Assessment
Dated: 3/22/89



Study sites examined with analyte concentrations below certified reporting limits: None.

Prepared for:

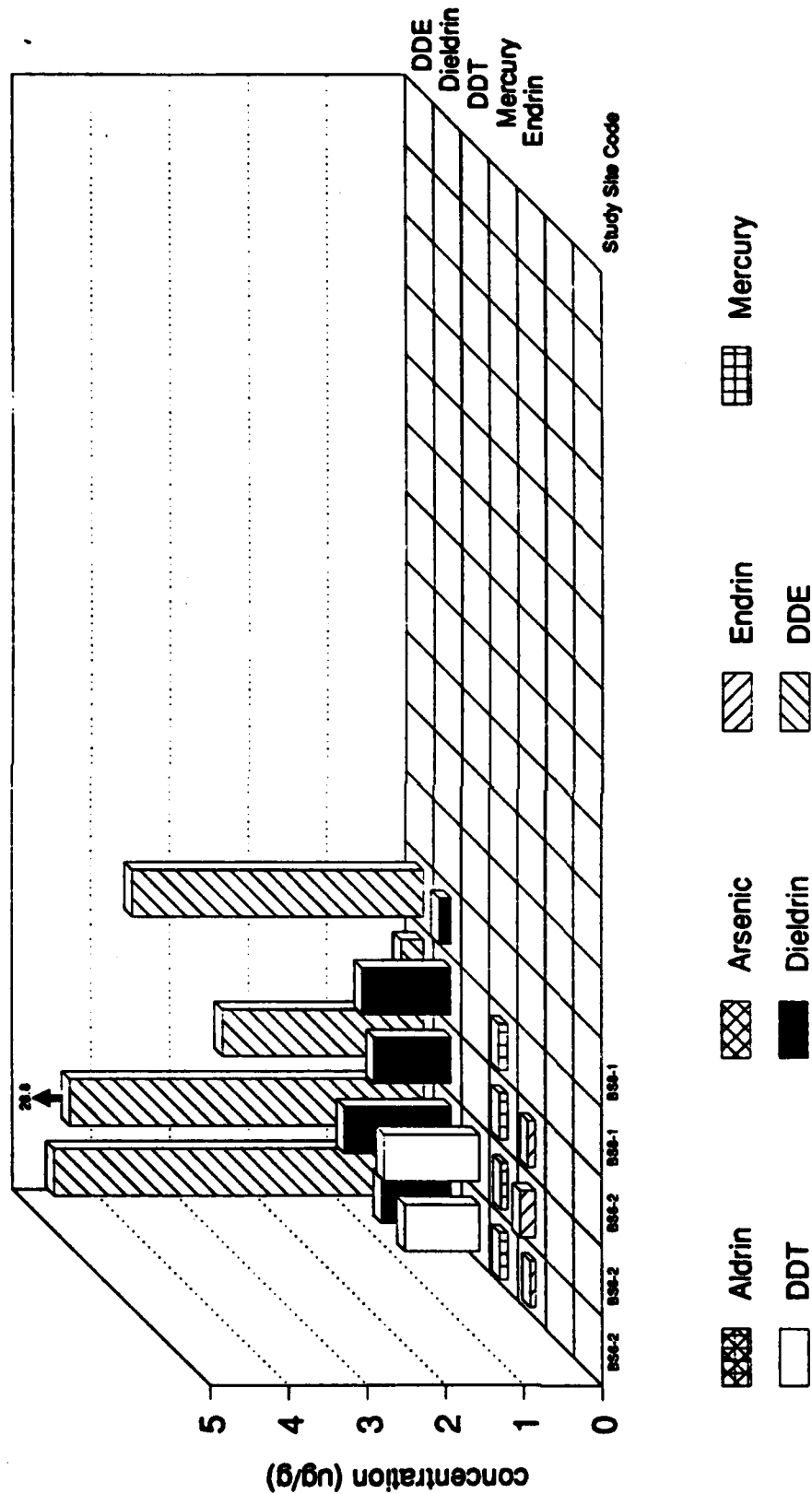
U. S. Army Program Manager for
Rocky Mountain Arsenal
Commerce City, Colorado

Prepared by: R.L. Stollar and Associates, Inc.
Ebasco Environmental

Figure 4.2-11

Analyte Concentrations vs. Study Site
Blue-winged Teal at RMA, 1989

CMP Biota Contamination Assessment
Drafted: 3/22/89



Study sites examined with analyte concentrations below certified reporting limits: None.

Prepared for:

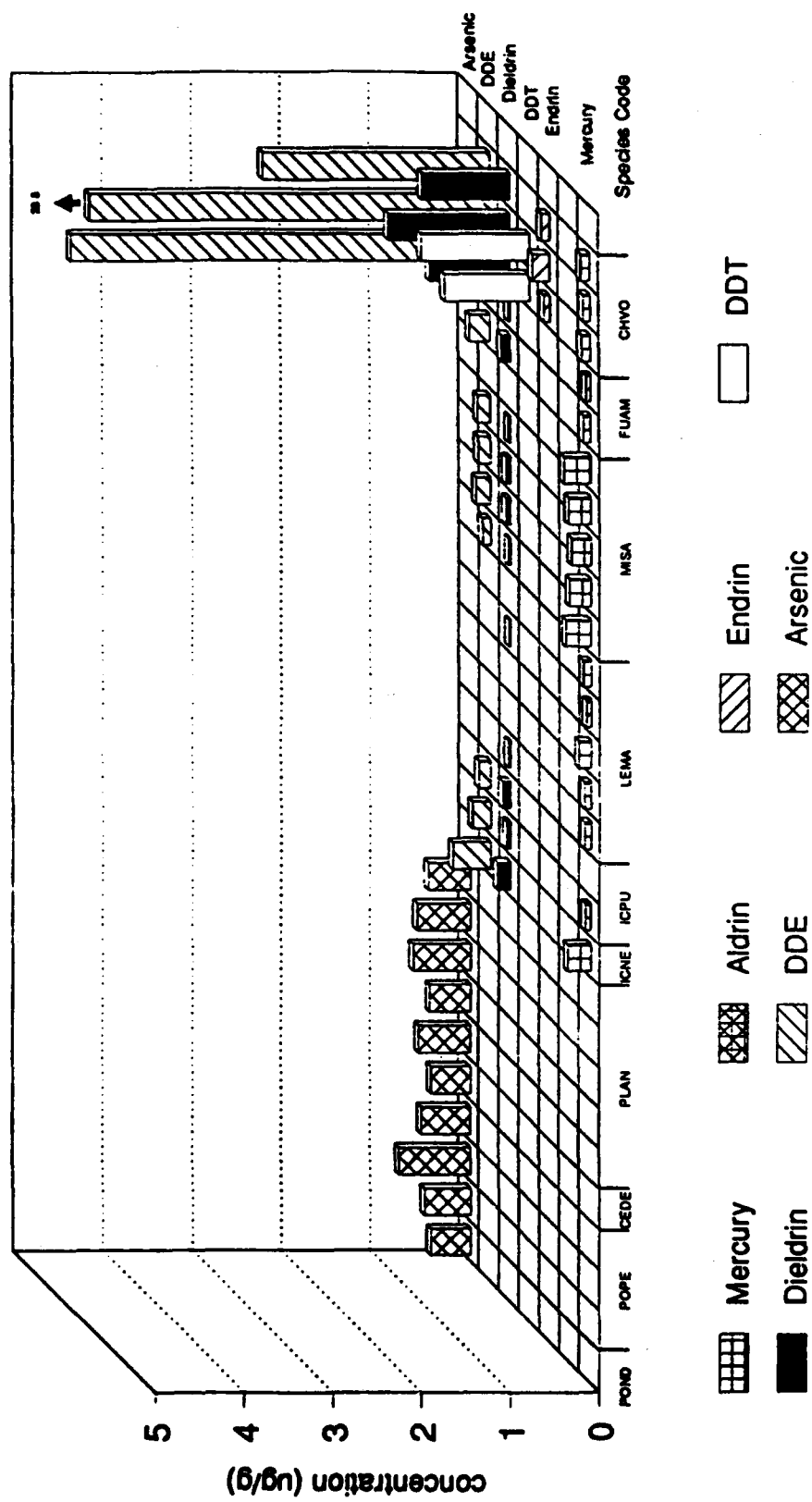
U. S. Army Program Manager for
Rocky Mountain Arsenal
Commerce City, Colorado

Prepared by: R.L. Stoller and Associates, Inc.
Ebasco Environmental

Figure 4.2-13

Analyte Concentrations vs. Study Site
Killdeer at RMA, 1989

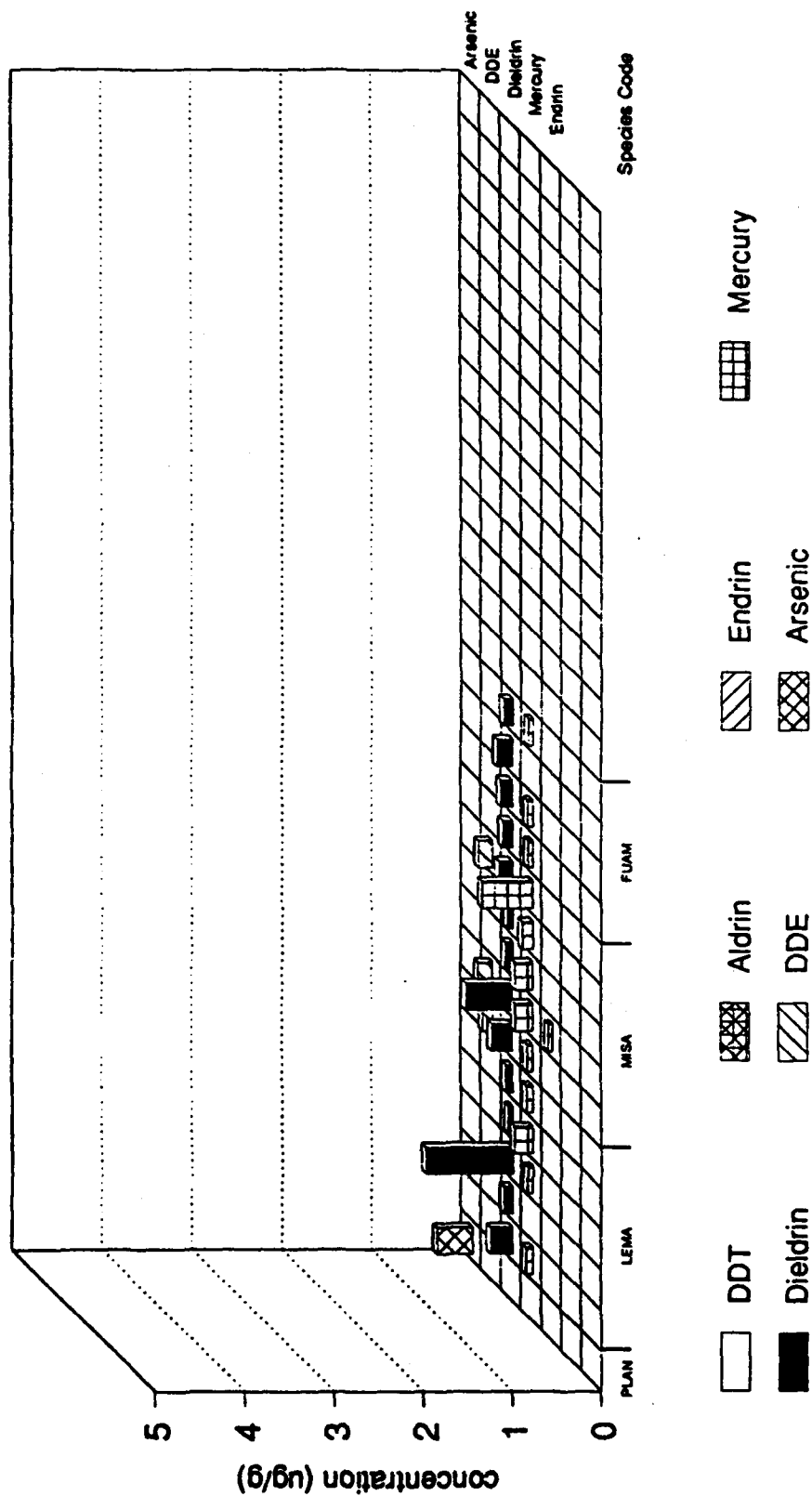
CMP Biota Contamination Assessment
Drafted: 3/22/89



Species examined with analyte concentrations below certified reporting limits: None.

Sample analysis for POND, POPE, CEDE, and PLAN OCP samples has been delayed pending completion of laboratory certification.

Prepared for: U. S. Army Program Manager for Rocky Mountain Arsenal Commerce City, Colorado Prepared by: R.L. Stollar and Associates, Inc. Ebasco Environmental	Figure 4.2-14 Analyte Concentrations vs. Species BSA 6, Lake Mary, 1989 CMP Biota Contamination Assessment Drafted: 3/22/89
--	---



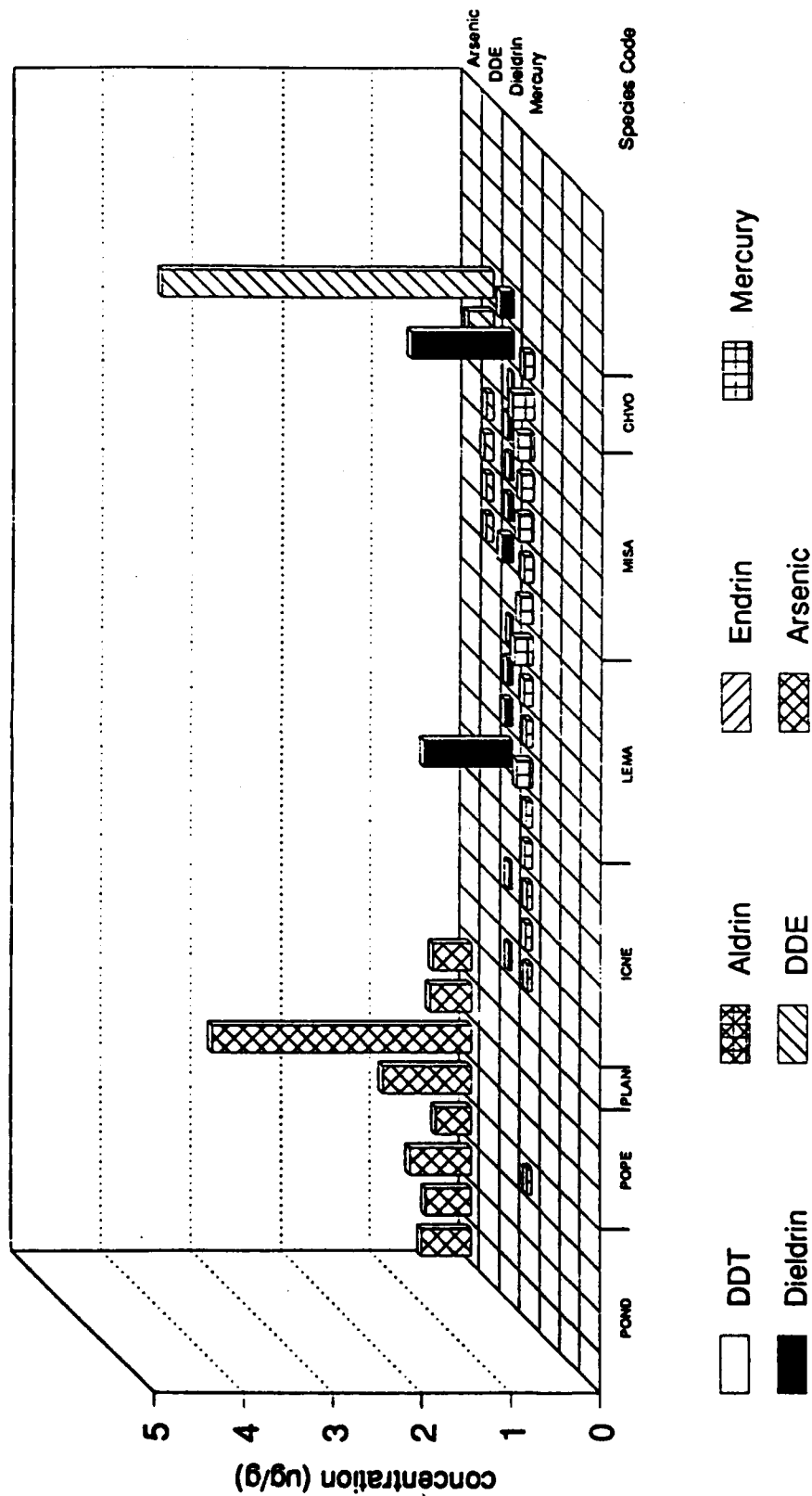
Sample analysis for POND, POPE, CEDE, and PLAN OCP samples has been delayed pending completion of laboratory certification.

Prepared for:

U. S. Army Program Manager for
Rocky Mountain Arsenal
Commerce City, Colorado
Prepared by: R.L. Stollar and Associates, Inc.
Ebasco Environmental

Figure 4.2-15

Analyte Concentrations vs. Species
BSA 7, Ladora Lake, 1989
CMP Biota Contamination Assessment
Drafted: 3/22/89



Species examined with analyte concentrations below certified reporting limits: None.

Sample analysis for POND, POPE, and PLAN OCP samples has been delayed pending completion of laboratory certification.

Prepared for:

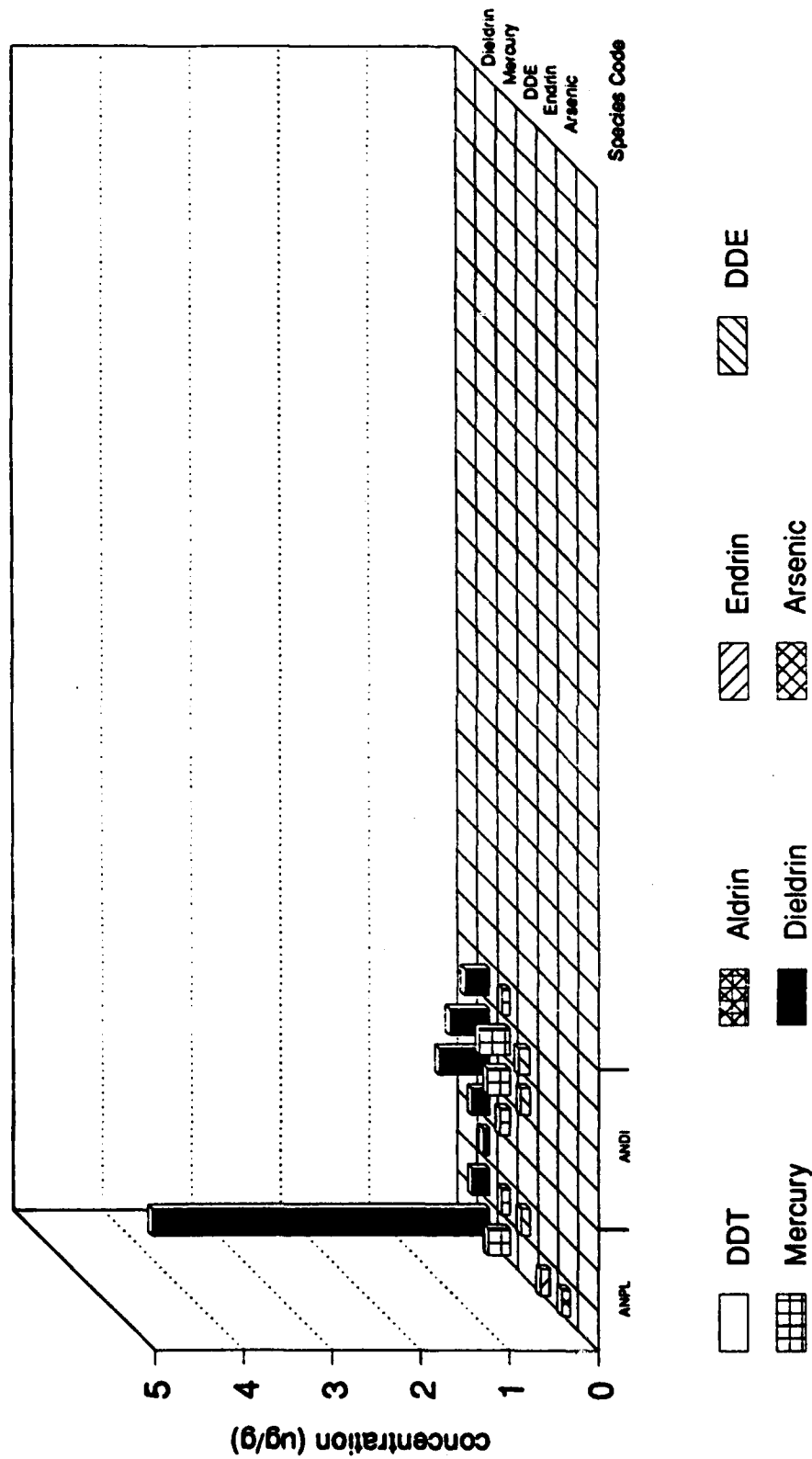
U. S. Army Program Manager for
Rocky Mountain Arsenal
Commerce City, Colorado

Prepared by: R.L. Stollar and Associates, Inc.
Ebasco Environmental

Figure 4.2-16

Analyte Concentrations vs. Species
BSA 8, Lower Derby Lake, 1989

CMP Biola Contamination Assessment
Drafted: 3/22/89

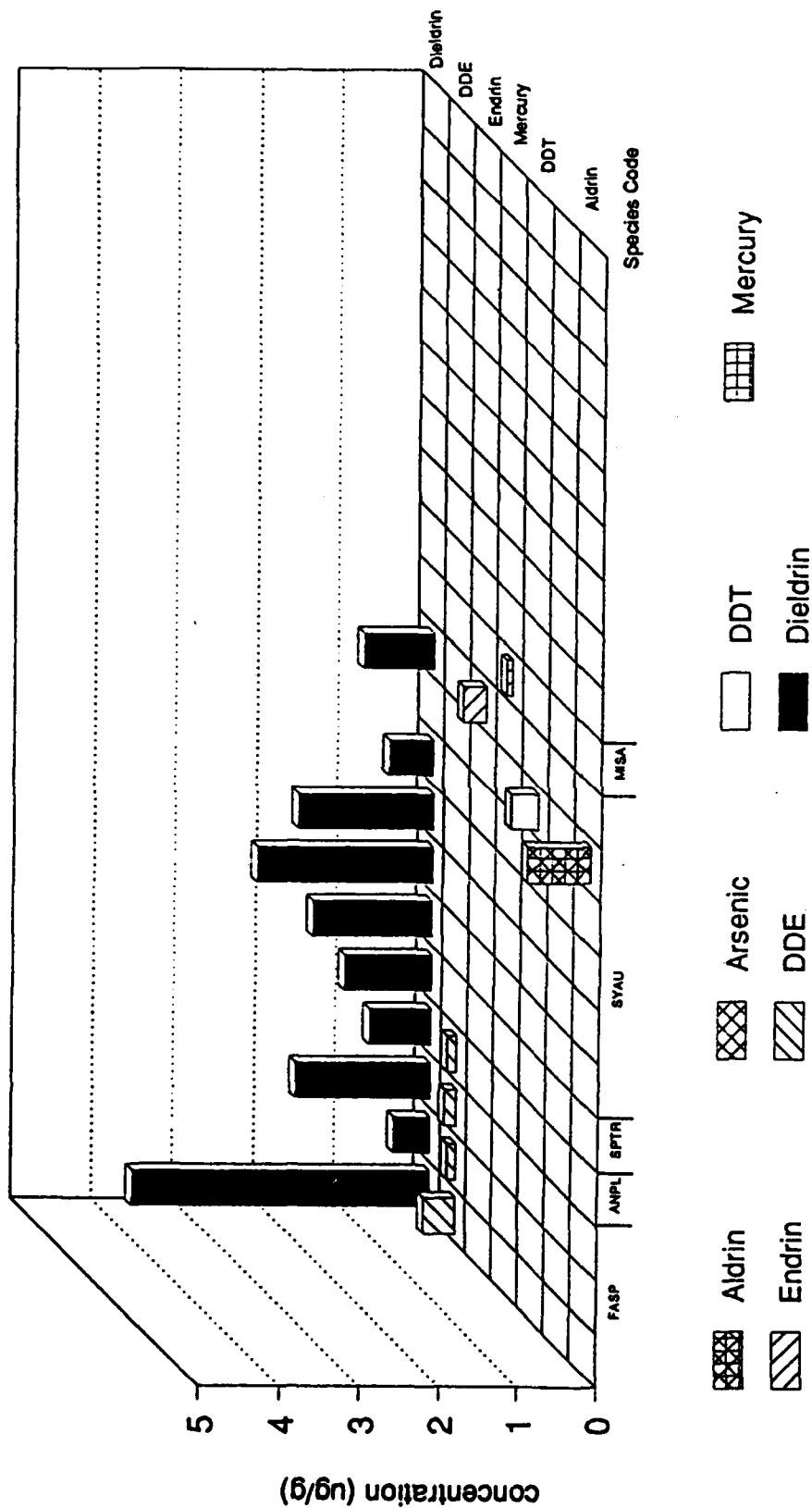


Prepared for:

U. S. Army Program Manager for
Rocky Mountain Arsenal
Commerce City, Colorado
Prepared by: R.L. Stolar and Associates, Inc.
Ebasco Environmental

Figure 4.2-17

Analyte Concentrations vs. Species
BSA 10, Upper Derby Lake, 1989
CMP Biota Contamination Assessment
Drafted: 3/22/89



Species examined at RMA with analyte concentrations below certified reporting limits: None.

Prepared for:

U. S. Army Program Manager for
Rocky Mountain Arsenal
Commerce City, Colorado

Prepared by: R.L. Stollar and Associates, Inc.
Ebasco Environmental

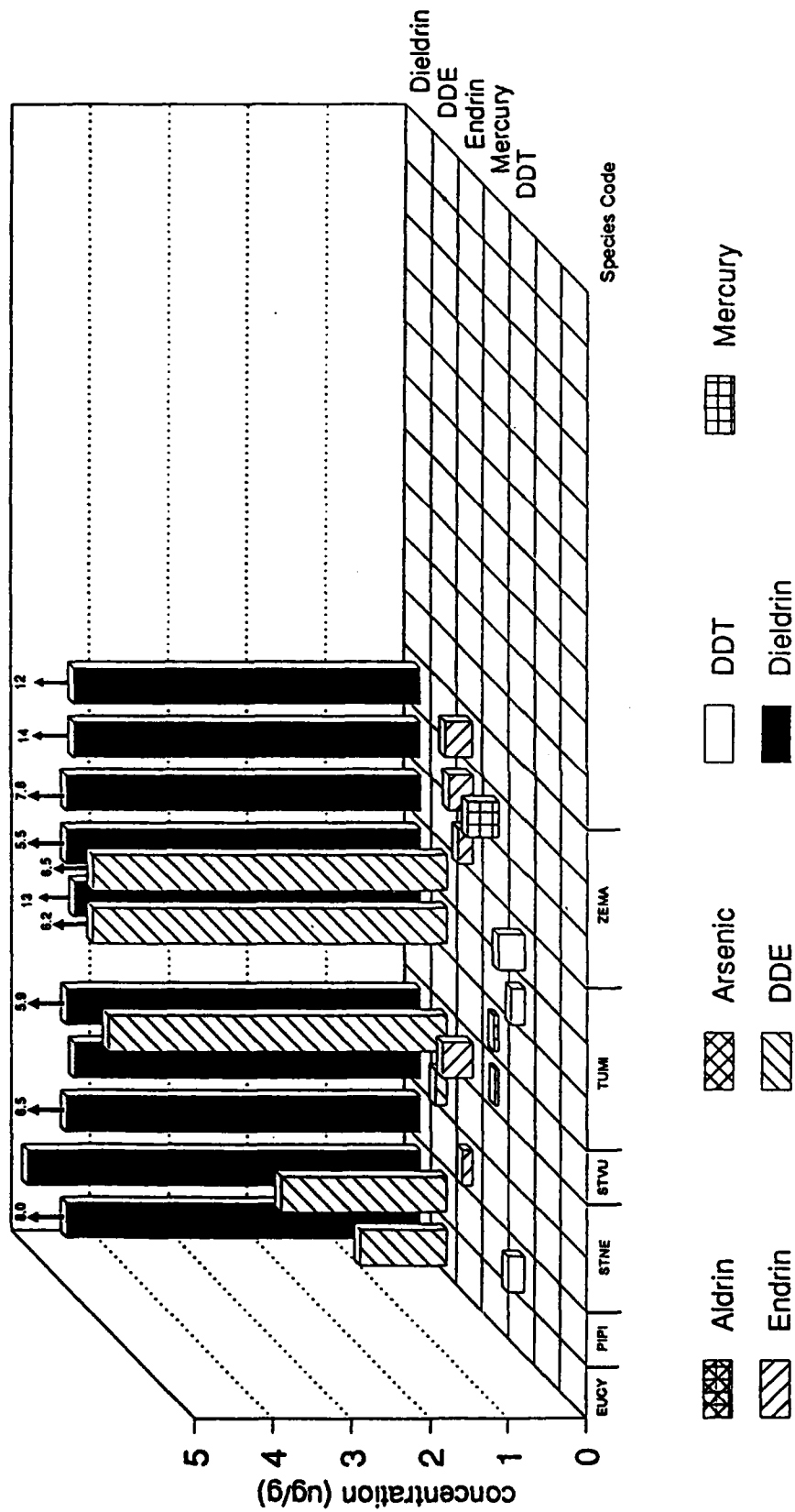
Figure 4.3-1

Analyte Concentrations vs. Species
Residual, Intentional

Samples Collected Under the 1988 Biota CMP

CMP Biota Contamination Assessment

Drafted: 3/22/89



Species examined at RMA with analyte concentrations below certified reporting limits: None.

Prepared for:

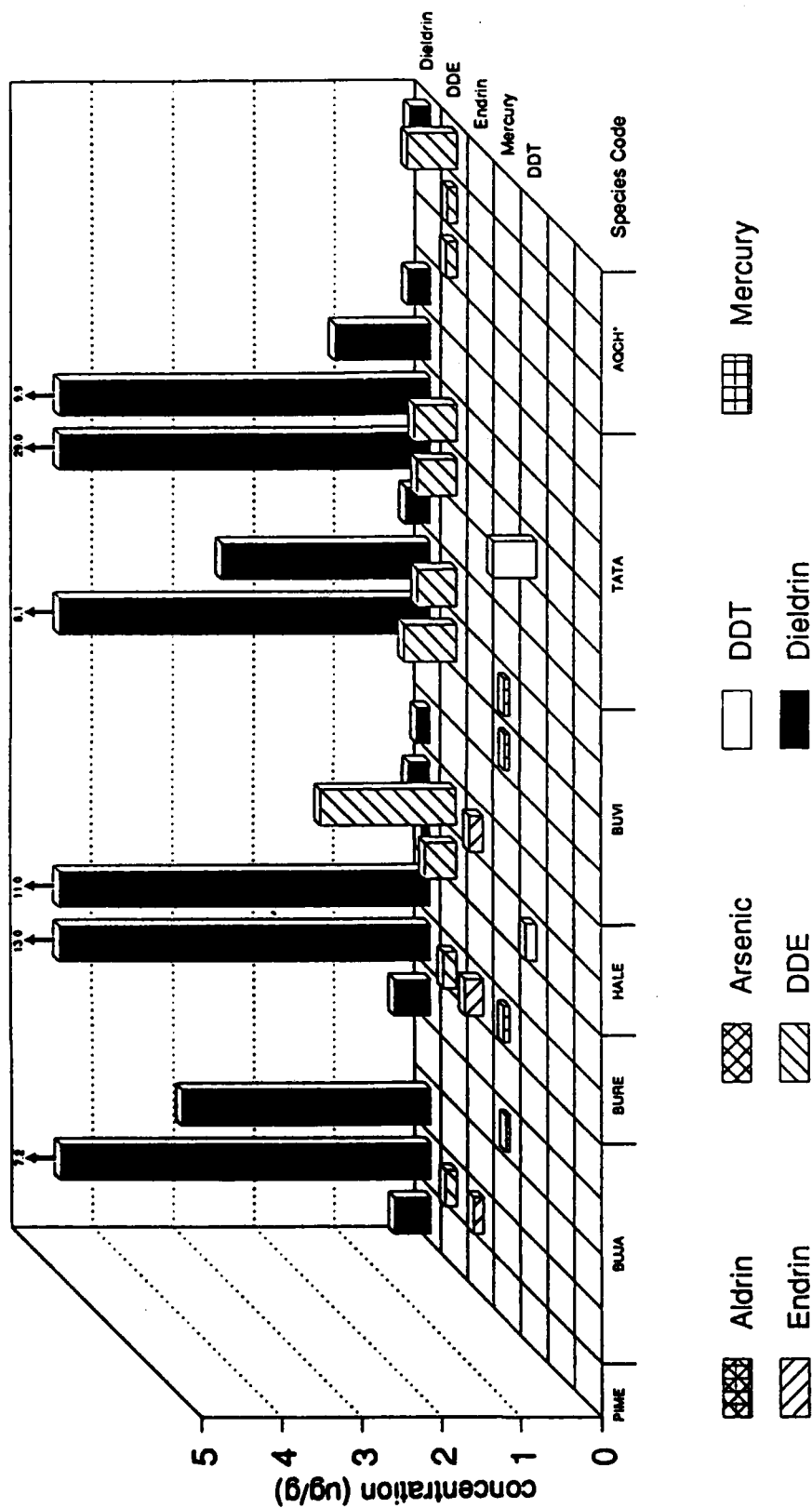
U. S. Army Program Manager for
Rocky Mountain Arsenal
Commerce City, Colorado

Prepared by: R.L. Stollar and Associates, Inc.
Ebasco Environmental

Figure 4.3-2

Analyte Concentrations vs. Species
Fortitious Herbivores/Omnivores at RMA
Collected Under the 1988 Biota CMP

CMP Biota Contamination Assessment
Drafted: 3/22/89



Species examined at RMA with analyte concentrations below certified reporting limits: BUSW.

*AQCH sample collected at Barr Lake.

Prepared for:

U. S. Army Program Manager for
Rocky Mountain Arsenal
Commerce City, Colorado

Prepared by: R.L. Stollar and Associates, Inc.
Ebasco Environmental

Figure 4.3-3

Analyte Concentrations vs. Species
Fortuitous Carnivores at RMA,
Collected Under the 1988 Biota CMP

CMP Biota Contamination Assessment
Drafted: 3/22/89